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Southern Medical Association, Forty-Fifth Annual Meeting, Dallas, Texas, November 5-8, 1951

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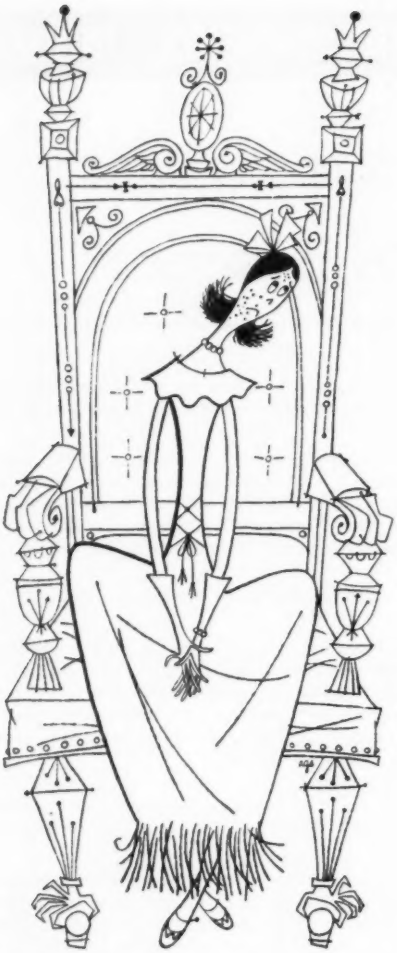

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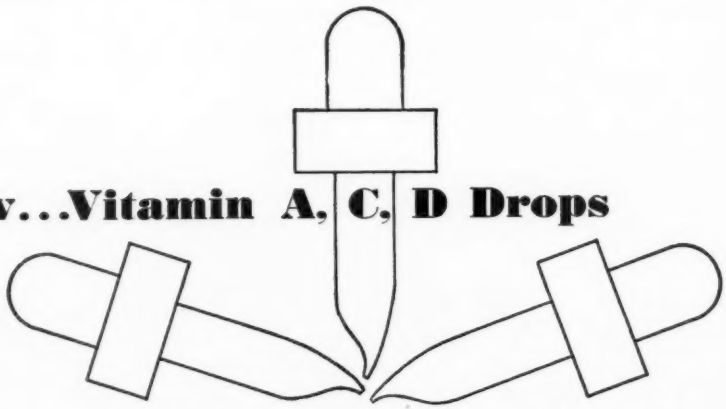

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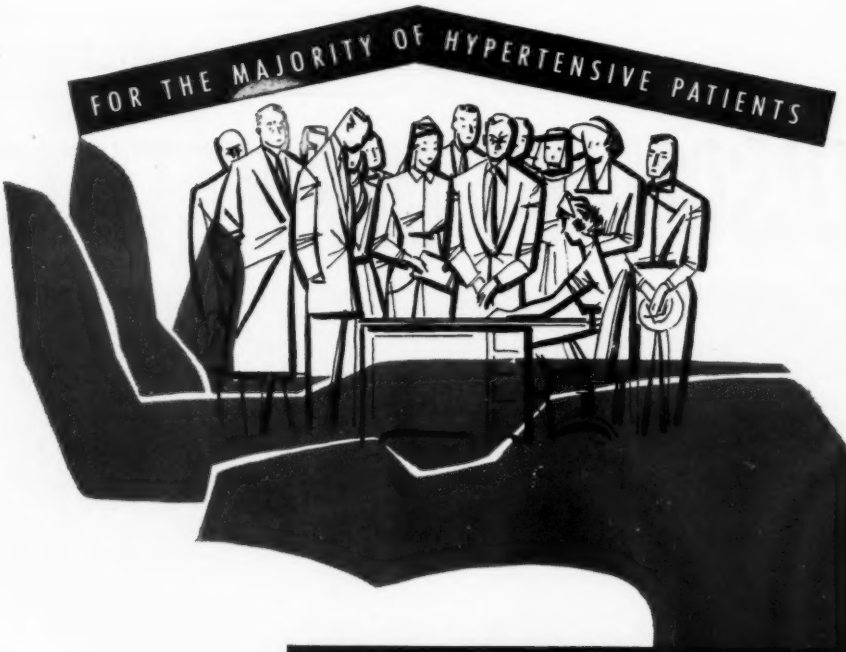

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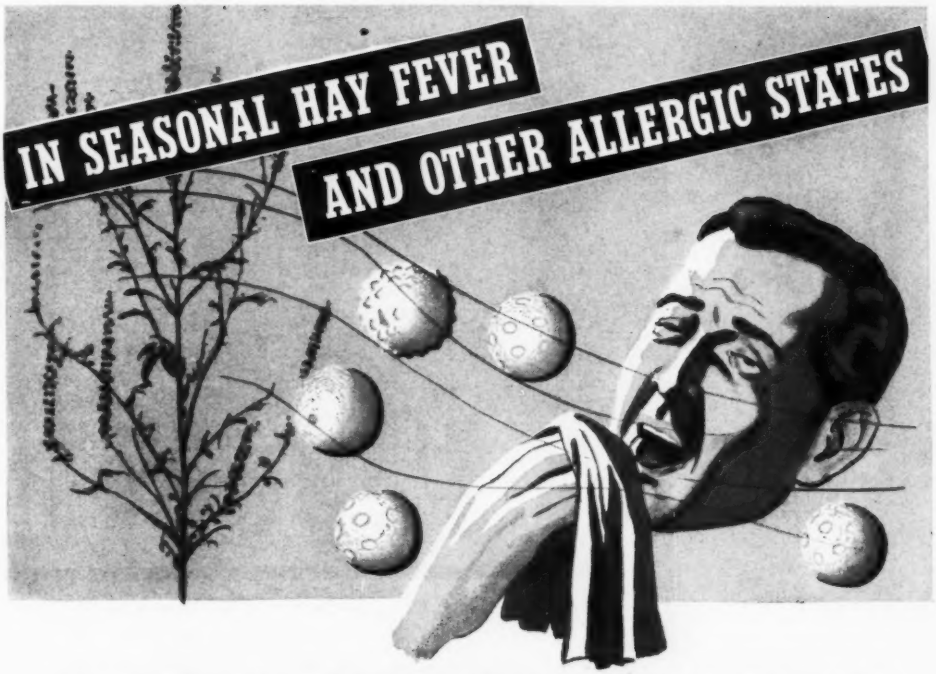

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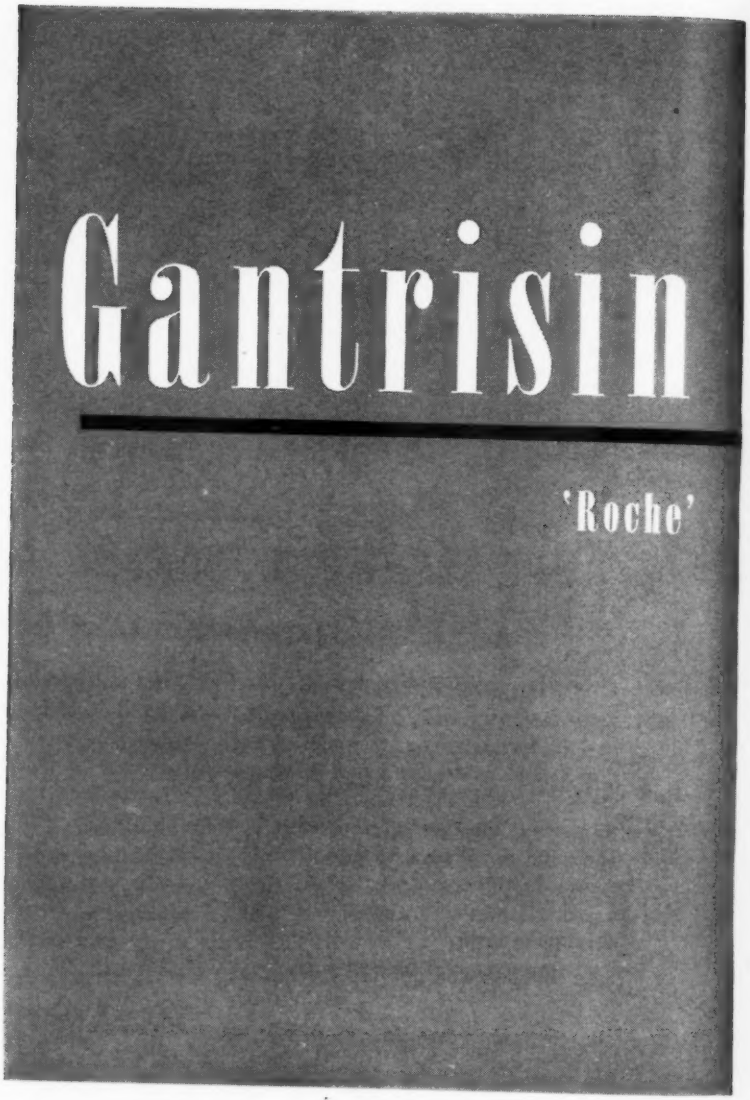
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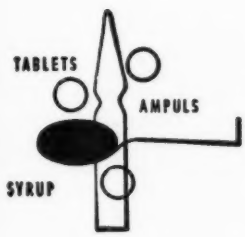

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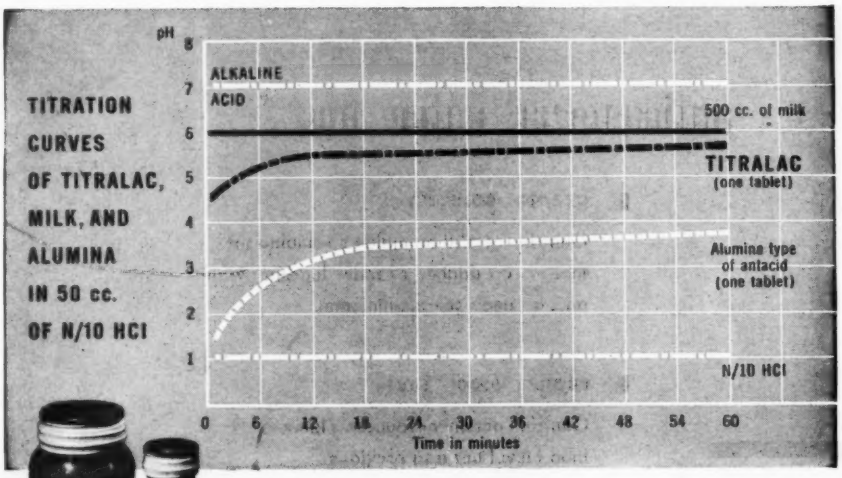

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1. Rossett, N. E., and Flexner, J.: Ann. Int. Med. 18: 193 (1944). 2. Freezer, C. R. E.; Gibson, C. S., and Matthews, E.: Guy's Hosp. Reports 78: 191 (1928). 3. Aaron, A. H.; Lipp, W. F., and Milch, E.: J. A. M. A. 139: 514 (Feb. 19) 1949. 4. Kirsner, J. B., and Palmer, W. L.: Illinois M. J. 94: 357 (Dec.) 1948. 5. Kimball, S.: in Practice of Medicine (Tice). Hagerstown, Md., W. F. Prior Company, Inc., 1948; p. 210. 6. Special Article: M. Times 76: 10 (Jan.) 1948.

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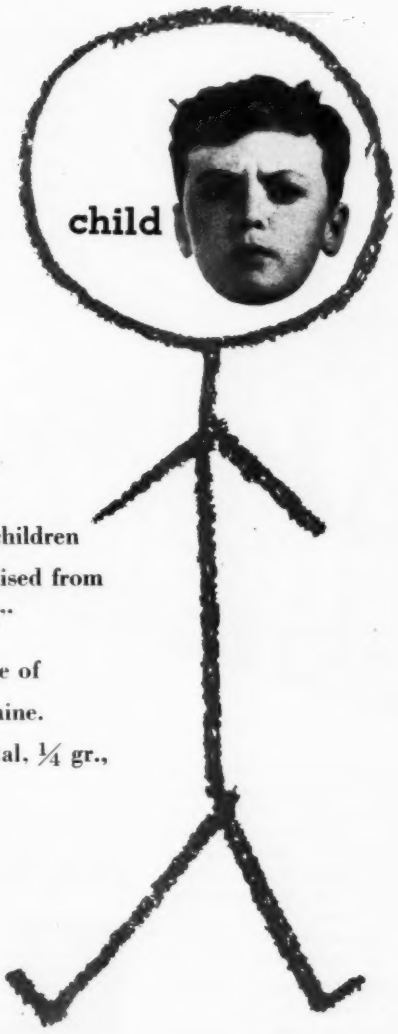

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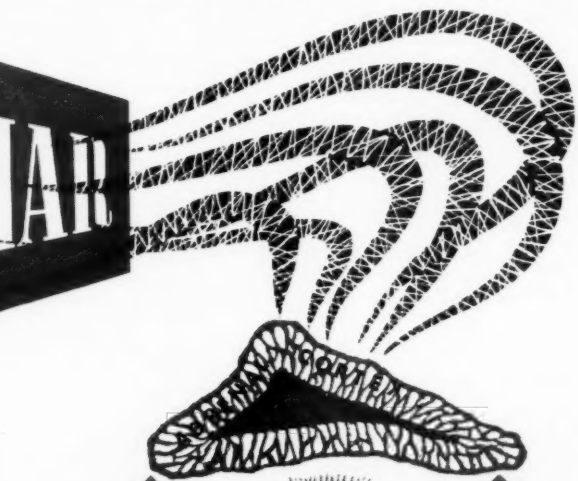

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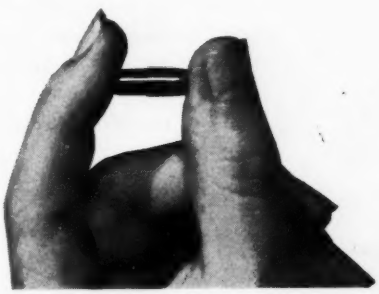

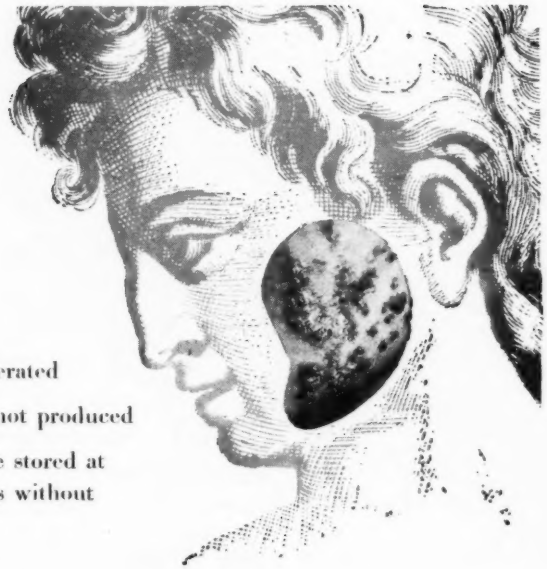

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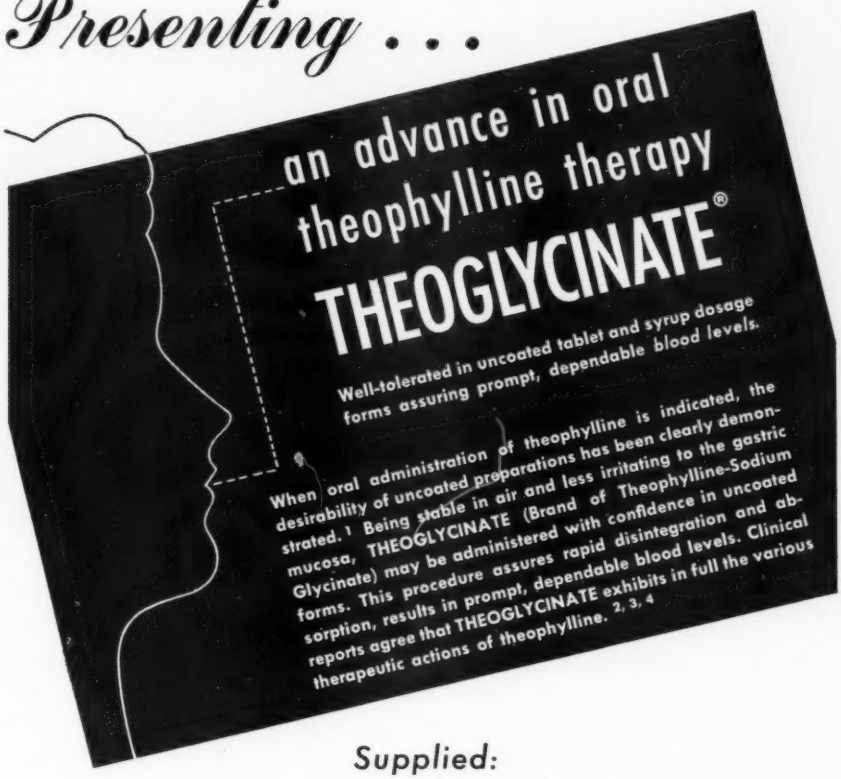
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When oral administration of theophylline is indicated, the desirability of uncoated preparations has been clearly demonstrated.[1] Being stable in air and less irritating to the gastric mucosa, THEOGLYCINATE (Brand of Theophylline-Sodium Glycinate) may be administered with confidence in uncoated forms. This procedure assures rapid disintegration and absorption, results in prompt, dependable blood levels. Clinical reports agree that THEOGLYCINATE exhibits in full the various therapeutic actions of theophylline.[2, 3, 4]

Supplied:

Uncoated Tablets in bottles of 100 (Each tablet: 5 grains Theophylline-Sodium Glycinate, equivalent 2½ grains Theophylline U.S.P.)

Syrup in 8 ounce bottles (2 grains Theophylline-Sodium Glycinate per 4 cc. teaspoonful, equivalent 1 grain Theophylline U.S.P.)

Suppositories—Boxes of 12 (Each suppository: 12 grains Theophylline-Sodium Glycinate, equivalent 6 grains Theophylline U.S.P.)

1. Waxler and Schack, J.A.M.A., 143:736 (1950).
2. Bubert and Cook, Bull. Univ. Maryland Medical School, 32:175 (1948).
3. Paul and Montgomery, Jnl. Iowa State Medical Society, 38:237 (1948).
4. Krantz, Holbert, Iwamoto and Carr, J.A.Ph.A., 36:148 (1947).

To: Brayten Pharmaceutical Company
Chattanooga 9, Tennessee Dept. SM-3

Please forward to me free physicians sample and latest brochure on THEOGLYCINATE

_____M.D.

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BRAYTEN
PHARMACEUTICAL CO.

Chattanooga 9, Tennessee

Tranquilize **THE HYPERTENSIVE**

WITH CONSERVATIVE, GENTLE MEDICATION

As a supplement to simple instructions on sensible living, the combined effects of sedation and vasodilation help to reduce nervous and vascular tension.

Theominal exerts a general tranquilizing effect and thus helps to control emotional outbursts that may induce dangerous vascular crises. With continued administration of Theominal a gradual reduction of blood pressure to a more normal level frequently occurs with relief of hypertensive symptoms such as congestive headache, chest pains, vertigo and dyspnea.

DOSE: 1 tablet two or three times daily. With improvement the dose may be reduced or omitted periodically. Each tablet contains theobromine 5 grains and Luminal® ½ grain.

Winthrop-Stearns Inc. • ***New York 18, N. Y.*** • ***Windsor, Ont.***

THEOMINAL®

VASODILATOR SEDATIVE FOR ARTERIAL HYPERTENSION

Supplied in bottles of 25, 100 and 500 tablets

Theominal, trademark reg. U. S. & Canada
Luminal, trademark reg. U. S. & Canada, brand of phenobarbital

VISIT BREON BOOTH K 8

A MORE ADEQUATE APPROACH TO MENOPAUSAL THERAPY

TRANSIBARB Capsules provide threefold, symptomatic relief in the management of the menopausal patient . . . adequate sedation . . . cerebral stimulation . . . control of vasomotor instability.

TRANSIBARB takes full advantage of the increasing use of a central nervous system stimulant combined with effective proportions of sedative medication. In addition, vitamin E is employed in the formula for its demonstrated efficacy in menopausal therapy.

In geriatrics, too, TRANSIBARB tends to minimize nervous apprehension in debilitated and mentally depressed patients.

Each TRANSIBARB Capsule contains phenobarbital, (Warning: May be habit forming), ¼ gr., d-desoxyephedrine HCl., 2.5 mg., and vitamin E (dl-alpha tocopheryl acetate), 5 mg.

DOSAGE: One capsule, an hour after breakfast; one capsule, an hour after lunch. In exceptional cases, a third capsule may be given, if required, an hour after the evening meal.

TRANSIBARB

TRADEMARK

Sedative—Sympathomimetic

SUPPLIED: Bottles of 500 and 1000 capsules, at all drug stores.

Literature and samples to physicians on request.

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George A. Breon & Company

Pharmaceutical Chemists

NEW YORK 18, N. Y.

e.g.

"Premarin" with
Methyltestosterone
wherever combined estrogen-androgen
therapy is indicated.

In the treatment of fractures and osteoporosis in either sex to promote bone development, tissue growth, and repair.

e.g.

"PREMARIN"®

In the treatment of the female climacteric in certain selected cases.

"Premarin" with
Methyltestosterone
wherever combined estrogen-androgen
therapy is indicated.

WITH

METHYLTESTOSTERONE

e.g.

In the treatment of dysmenorrhea in an attempt to suppress ovulation on the basis that anovulatory bleeding is usually painless.

for combined estrogen-androgen therapy

e.g.

In the treatment of the male climacteric to reduce follicle-stimulating hormone levels.

"Premarin" with Methyltestosterone provides a steroid combination designed to permit utilization of both the complementary and the neutralizing effects of estrogen and androgen when administered concomitantly. Thus certain properties of either sex hormone may be employed in the opposite sex with a minimum of side effects.

Availability: Each tablet provides estrogens in their naturally occurring, water-soluble, conjugated form expressed as sodium estrone sulfate, together with methyltestosterone.

No. **879**—Conjugated estrogens equine ("Premarin") ..... 1.25 mg.
Methyltestosterone ..... 10.0 mg.
Bottles of 100 tablets (yellow)

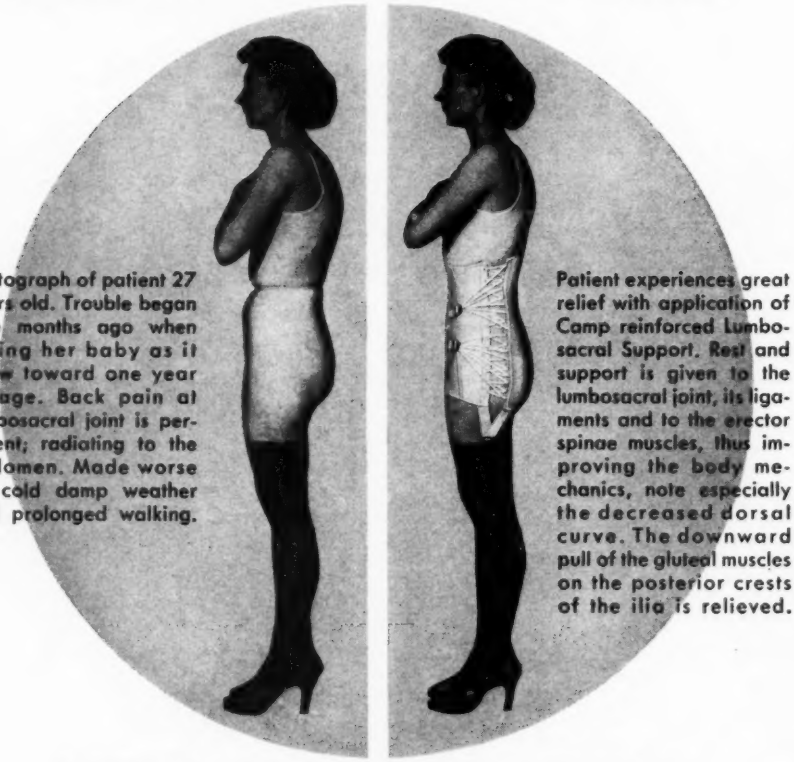
No. **878**—Conjugated estrogens equine ("Premarin") ..... 0.625 mg.
Methyltestosterone ..... 5.0 mg.
Bottles of 100 tablets (red)

AYERST, McKENNA & HARRISON LIMITED
22 East 40th Street,
New York 16, New York

Ayerst

WATER–
DISPERSIBLE A&D
PALATABLE
VIFORT
EFFECTIVE FOR YOUNG AND OLD
8 VITAMINS IN ONE PRODUCT
Each 0.6 cc. contains:
Vitamin A 5,000 U.S.P. Units
Vitamin D 1,200 U.S.P. Units
Thiamine Hydrochloride 1.8 mg.
Riboflavin 0.4 mg.
Pyridoxine Hydrochloride 0.3 mg.
Ascorbic Acid 60 mg.
Niacinamide 6 mg.
Pantothenic Acid 1.2 mg.
Supplied in 15 and 30 cc. Dropper Bottles.
Samples sent on request.
VIFORT®
polyvitamin drops
Endo
ENDO PRODUCTS INC. · RICHMOND HILL 18, NEW YORK

MILD HYPERTROPHIC ARTHRITIS OF LUMBOSACRAL JOINT
and
TENDERNESS OF ERECTOR SPINAE MUSCLES



Photograph of patient 27 years old. Trouble began nine months ago when lifting her baby as it grew toward one year of age. Back pain at lumbosacral joint is persistent; radiating to the abdomen. Made worse by cold damp weather and prolonged walking.

Patient experiences great relief with application of Camp reinforced Lumbosacral Support. Rest and support is given to the lumbosacral joint, its ligaments and to the erector spinae muscles, thus improving the body mechanics, note especially the decreased dorsal curve. The downward pull of the gluteal muscles on the posterior crests of the ilia is relieved.

Camp Orthopedic Supports help many patients suffering from osteo-arthritis of the spine

When the dorsal region of the spine is involved, higher supports than the one illustrated are provided by Camp. All lend themselves readily to reinforcement.

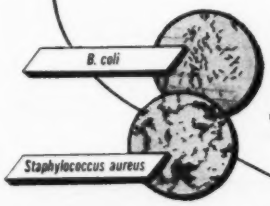
CAMP Supports
TRADE MARK

S. H. CAMP & COMPANY • Jackson, Michigan

World's Largest Manufacturers of Scientific Supports

OFFICES IN NEW YORK • CHICAGO • WINDSOR, ONTARIO • LONDON, ENGLAND

Anatomical Selectivity



+ *Broad Bacteriostasis . . . . .*

safe RELIEF

URO-PHOSPHATE, excreted in the urine, is naturally concentrated in the pathological area.

URO-PHOSPHATE, while employed most frequently against B. coli infections, also possesses potential utility against a wide variety of both gram-positive and gram-negative organisms, as indicated by basic studies of formaldehyde.

URO-PHOSPHATE is non-cumulative and non-toxic. It provides safe relief from painful symptoms especially in older patients unable to withstand the rigors of other antibacterial therapy.

URO-PHOSPHATE is a balanced combination of 7½ grains of highly purified methenamine and 10 grains of acid sodium phosphate to ensure the acidification necessary for effective release of formaldehyde.

● **DOSAGE**—in acute infections: 2 tablets in ½ glassful of water 3-4 times daily three hours after meals.

● **SUPPLIED**—in tightly-sealed bottles of 100 tablets.

URO-PHOSPHATE

WILLIAM P. POYTHRESS & CO., INC., Richmond, Virginia

POYTHRESS

Patient Carries on Normal Pursuits

THROUGH GRATIFYING RELIEF

of the symptoms of urinary tract infection

Throughout the course of treatment for urinary disorders many patients continue their usual activities, thanks to analgesia produced with orally administered Pyridium.

Pyridium can be safely administered concomitantly with antibiotics, the sulfonamides, and other specific therapy.

An analysis of symptomatic relief in 118 cases treated with Pyridium shows:*

Urinary frequency promptly relieved in 85% of cases.

Pain and burning decreased in 93% of cases.

*Kirwin, T. J., Lowsley, O. S., and Manning, J.: Effects of Pyridium in certain urogenital infections, *Am. J. Surg.* **62**: 330-335, December 1943.

The complete story of Pyridium and its clinical uses is available on request.

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(Brand of Phenylazo-diamino-pyridine HCl)

Pyridium is the trade-mark of Nepera Chemical Co., Inc., successor to Pyridium Corporation, for its brand of phenylazo-diamino-pyridine HCl. Merck & Co., Inc. sole distributor in the United States.

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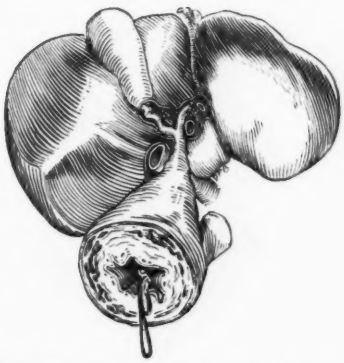
Physiologic

IN GALLBLADDER MANAGEMENT



NUBILIC represents the modern trend in the management of inflamed and congested gallbladder and bile ducts.

NUBILIC contains dehydrocholic acid, an efficient hydrocholeretic agent which thins the liver bile and flushes the biliary passages.

NUBILIC contains belladonna, which encourages free drainage and relaxes the sphincter of Oddi. This action is further enhanced by the central sedation of phenobarbital.

NUBILIC

Each Nubilic Tablet contains:

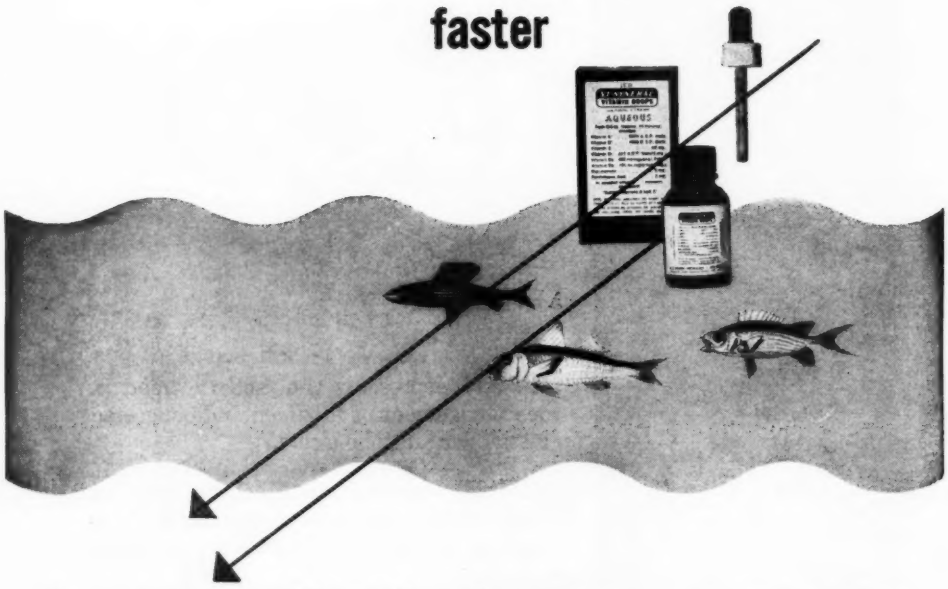
Dehydrocholic acid	0.25 Gm. (3¾ gr.)
Phenobarbital	8 mg. (⅛ gr.)
Belladonna	8 mg. (⅛ gr.)

Bottles of 25, 50 and 100 tablets

NUMOTIZINE, Inc.

900 N. Franklin Street • Chicago 10, Illinois, U.S.A.

water gets the oil there faster



vi-syneral vitamin drops

CONTAINS 100% NATURAL VITAMIN D, THE SUPERIOR ANTI-RACHITIC

Great Advance in Vitamin Therapy . . . this oil-in-water solution developed by the Research Laboratories of U. S. Vitamin Corporation. Clinical literature* emphasizes the superiority of aqueous solutions of vitamin A compared to oily solutions (such as percomorph oils) . . .

500% GREATER ABSORPTION
85% HIGHER LIVER STORAGE
1/5th AS MUCH EXCRETION

Each 0.6 cc. provides:

VITAMIN A (natural) .	5,000 units
VITAMIN D (natural) .	1,000 units
ASCORBIC ACID . .	50 mg.
THIAMINE	1 mg.
NIACINAMIDE . . .	5 mg.
RIBOFLAVIN . . .	.4 mg.
PYRIDOXINE . . .	.1 mg.
PANTOTHENIC ACID	2 mg.

*Literature and samples upon request

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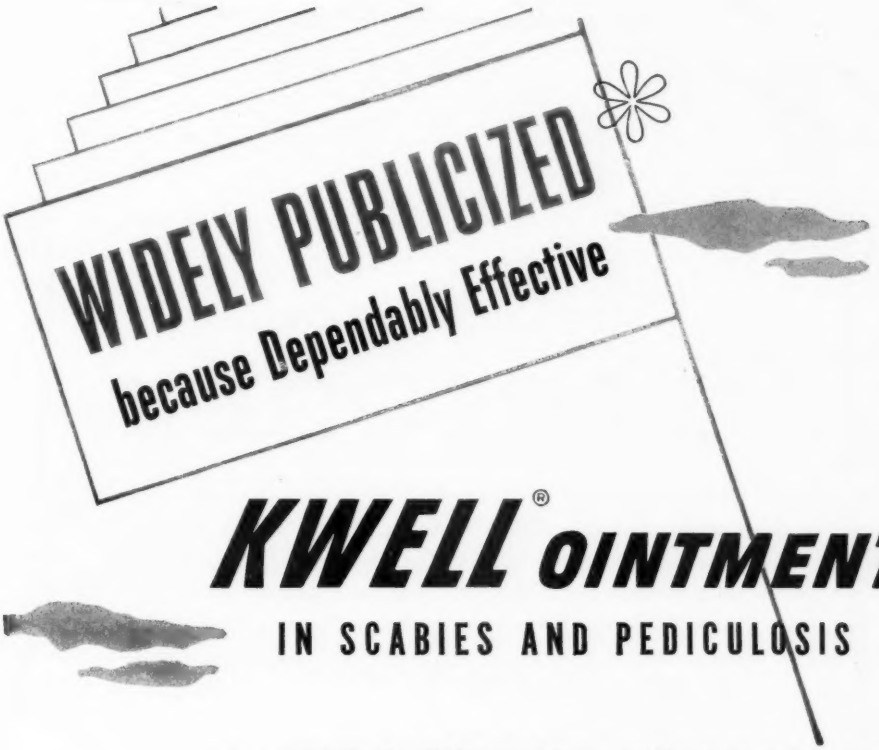

KWELL® OINTMENT

IN SCABIES AND PEDICULOSIS

As a scabicide, Kwell Ointment leaves nothing to be desired. Its rate of cure is high—over 90%—on a single application. It is non-irritant and does not leave a contact dermatitis in its wake. It is clean—greaseless and pleasantly scented—and does not stain clothing or bed linen. It may be used in the presence of secondary infection without fear of undesirable side actions. It is usually effective when other scabicides fail.

As a pediculicide, Kwell Ointment performs equally well. It is promptly destructive for every type of louse which infests the human body.

Kwell Ointment contains 1 per cent of the gamma isomer of benzene hexachloride in a vanishing cream base. Its active ingredient is highly lethal for the Sarcoptes scabiei and pediculi, but in the concentration employed is non-toxic for man. Kwell Ointment is available on prescription in 2 oz. and 1 pound jars. The former is usually adequate for one patient.

*** REFERENCES**

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3. Niedelman, M. L.: J. Pediat. 32:566 (May) 1948.
4. Cannon, A. B., and McRae, M. E.: J.A.M.A. 138:557 (Oct. 23) 1948.
5. Appel, B.: New England J. Med. 243:74 (July 20) 1950.

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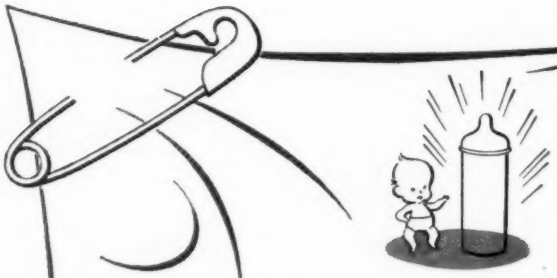
COMMERCIAL SOLVENTS CORPORATION, 17 E. 42ND STREET, NEW YORK 17, N. Y.



When Lactation Fails

℞ LACTOGEN®

When the supply of breast milk is inadequate or when lactation fails entirely, there is no better formula than Lactogen. Designed to resemble mother's milk, it consists of whole cow's milk modified with milk fat and milk sugar. It differs, however, in one important respect: the protein content of Lactogen in normal dilution is one-third greater than that of mother's milk—2.0% instead of 1.5%.

A Complete Infant Formula In One Package

Lactogen contains all the ingredients of a well-balanced infant formula. In addition, it is fortified with iron to compensate for the deficiency of this mineral in milk.

Easily Prepared . . . Merely Add Water

Lactogen is simple to use. The prescribed amount is stirred into warm, previously boiled water. Either a single feeding can be prepared, or the entire day's quantity can be made up and stored in the refrigerator until used.

THE NESTLÉ COMPANY, INC.
COLORADO SPRINGS, COLORADO

ACCEPTED COUNCIL ON FOODS AND NUTRITION AMERICAN MEDICAL ASSOCIATION

NOTABLY HIGH IN PROTEIN CONTENT
Lactogen contains a generous amount of protein . . . more than enough to satisfy every protein need of the rapidly growing infant.

For the Common Anemias...

The Squibb **RUBRA** Family

	RUBRAMIN *per cc.*	**RUBRAFOLIN** *per capsule*	**RUBRATON** *per teaspoonful*	**RUBRAFERATE** *per capsule*
VITAMIN B_{12}	**15, 30 & 50** micrograms	**25** micrograms	**4.17** micrograms	**4.17** micrograms
FOLIC ACID		**1.67** milligrams	**0.28** milligrams	**0.28** milligrams
IRON			**220** milligrams ferric ammonium citrate	**130** milligrams ferrous sulfate exsic.
VITAMIN C				**50** milligrams
DOSAGE THERAPEUTIC	15 to 30 micrograms daily for a week or more; when neurologic involvement is present, 50 micrograms or more daily.	1 or 2 capsules daily	2 teaspoonfuls t.i.d.	2 capsules t.i.d.
MAINTENANCE	Generally, 30 to 50 micrograms twice a month; when neurologic involvement is present, 50 micrograms a week.	1 capsule daily	1 teaspoonful t.i.d.	1 capsule t.i.d.
SUPPLY	1 cc. ampuls, 15 & 30 micrograms of vitamin B_{12} per ampul. 5 & 10 cc. vials, 30 micrograms per cc. 10 cc. vials 50 micrograms per cc.	Bottles of 100	Pint and gallon bottles	Bottles of 100

NOTE: The above are average doses. As with all antianemia preparations, dosages must be adjusted to meet the needs of the individual patient.

Also available: Solution Rubramin Crystalline (Squibb Crystalline Vitamin B_{12} Solution) in 1 cc. ampuls, 15 micrograms of crystalline vitamin B_{12} per ampul, and 10 cc. vials, 30 micrograms of crystalline vitamin B_{12} per cc.

'RUBRAMIN' IS A REGISTERED TRADEMARK AND 'RUBRAFOLIN', 'RUBRATON' AND 'RUBRAFERATE' ARE TRADEMARKS OF E. R. SQUIBB & SONS

SQUIBB MANUFACTURING CHEMISTS TO THE MEDICAL PROFESSION SINCE 1858

for relaxation

of reflex spasm

You may provide prompt relief for many of your patients suffering from hemiplegia, Parkinsonism, low back pain and other neuromuscular disturbances by prescribing Oranixon 'Organon'—the first Council-accepted brand of mephenesin. Try Oranixon for some of your patients whose outlook seems hopeless—patients whose mentality and motor functions are "imprisoned" by their reflexes. You'll find that Oranixon has the unusual action of quieting overactive reflex motor centers without interfering with voluntary actions or normal reflexes. You can usually relax spasm and rigidity within a few days by prescribing 3 to 5 grams of Oranixon per day. Oranixon is available in 250-mg and 500-mg oral tablets and in an elixir containing 400 mg of mephenesin per teaspoonful.

Organon INC. • ORANGE, N. J.

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Escape from Pressure!

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for a Wonderful Vacation

7 day ALL-EXPENSE VACATION ONLY **$73.50** PLUS TRANSPORTATION

May 1st thru October 31st

$73.50 INCLUDES ALL THIS!...7 Glorious Days at Any of Several Luxurious Hotels in Nassau • Room with Bath (2 Persons to a Room) • All Meals • Sightseeing • Swimming • Dancing • Visit to Paradise Beach • Transfer Both Ways Between Nassau Hotel and Airport.

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Complete relaxation is possible at Nassau in the nearby Bahamas. In this charming British colony you'll find that life moves at a serene pace amid an atmosphere of matchless beauty. Sounds are muted...colours are soft and subdued. You'll delight in a climate compounded of balmy days and cool, starlit nights.

Hotel accommodations are all you'd expect of a fine resort . . unlimited recreation is yours to enjoy

And, when you return you may bring in $200 worth* of purchases U. S. duty-free...fine English imports, Scotch whisky, native handicraft, French perfumes.

*after 48 hours out of U. S.; $500 worth after 12 days

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50 MINUTES BY AIR FROM MIAMI

THE DEVELOPMENT BOARD

A DEPARTMENT OF THE BAHAMAS GOVERNMENT

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P. S. Think about Nassau as a locale for your next state convention!

As at the other end of the age gamut, optimal nutrition can make a tremendous difference in the vigor and stamina of the oldster.[1,6,8-11] Many geriatricians stress the importance of vitamin C in the management of geriatric diets,[2,5,9] and recommend a fully adequate intake[5,9] of citrus fruits and juices (so often neglected by older people)—because of their high content of this essential vitamin and of other nutrients. Fortunately most everyone likes the taste of Florida citrus fruits and juices. They may be served in a variety of ways, and—under modern techniques of processing and storage, whether fresh, canned or frozen—they can *retain their ascorbic acid content,*[3,7] *and their pleasing flavor,*[4] *in very high degree and over long periods.*

FLORIDA CITRUS COMMISSION • **LAKELAND, FLORIDA**

Citrus fruits—among the richest known sources of Vitamin C—also contain vitamins A and B, readily assimilable natural fruit sugars, and other factors, such as iron, calcium, citrates and citric acid.

FLORIDA

Oranges • Grapefruit • Tangerines

References:

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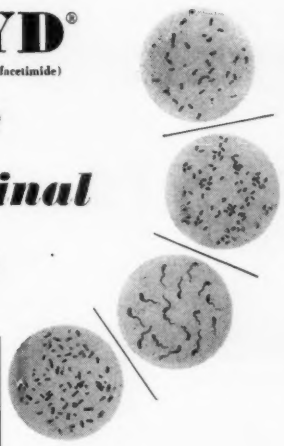
THALAMYD®

(brand of phthalylsulfacetimide)

eliminate intestinal organisms



SIMPLY
AND
SAFELY

Unique among nonabsorbable sulfonamides, THALAMYD is actually absorbed into the bowel wall in high concentration but only slightly absorbed into the blood stream.

Simple, safe therapy whenever the intestinal tract must be sterilized, THALAMYD has a broad field of usefulness: *prophylactically when preparing the gut for surgery; for bacillary dysentery and other acute enteritis; and to control secondary invaders in ulcerative colitis.*

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THALAMYD

SCHERING

NOT A SALT SUBSTITUTE

For edema control.

Sodium withdrawal—
without sodium depletion

NATRINIL
POWDER

No offensive odor or taste.
Maximum palatability.
Minimum dosage.
Great exchange capacity.
Fine texture.
Mixes readily.
Less bulk required.

Natrinil prevents edema formation by withdrawing sodium from the gastrointestinal tract. Natrinil is indicated in the management of congestive heart failure, hypertension, cirrhosis, or whenever a "salt-free" or a low sodium diet is required. Natrinil allows a more normal diet.

A Cation Exchange Resin of the Carboxylic Type
Hydrogen Cycle 80%
Potassium Cycle 20%

Natrinil Powder
Available, bottles of 10 oz.
Individual packets of 10 Gm. each, boxes of 24.

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VITAMIN A AND D OINTMENT

promotes healthy granulation, rapid epithelial repair; retards scar tissue formation; is particularly helpful in slow-healing, indolent wounds; pleasantly fragrant.

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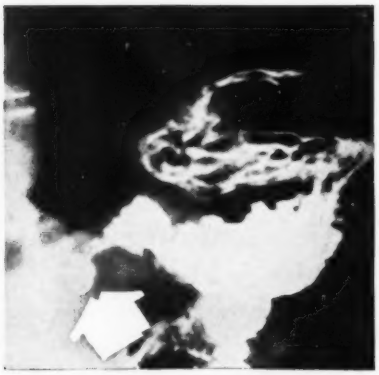
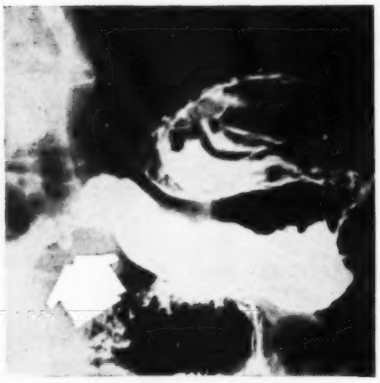
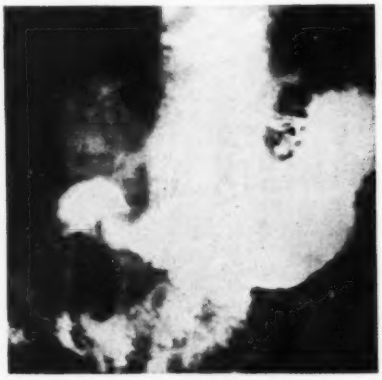


Before Banthine



At 23 Days



At 118 Days

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BROMIDE

Brand of Methantheline Bromide

—the neurogenic approach to peptic ulcer therapy—is a true anticholinergic agent.

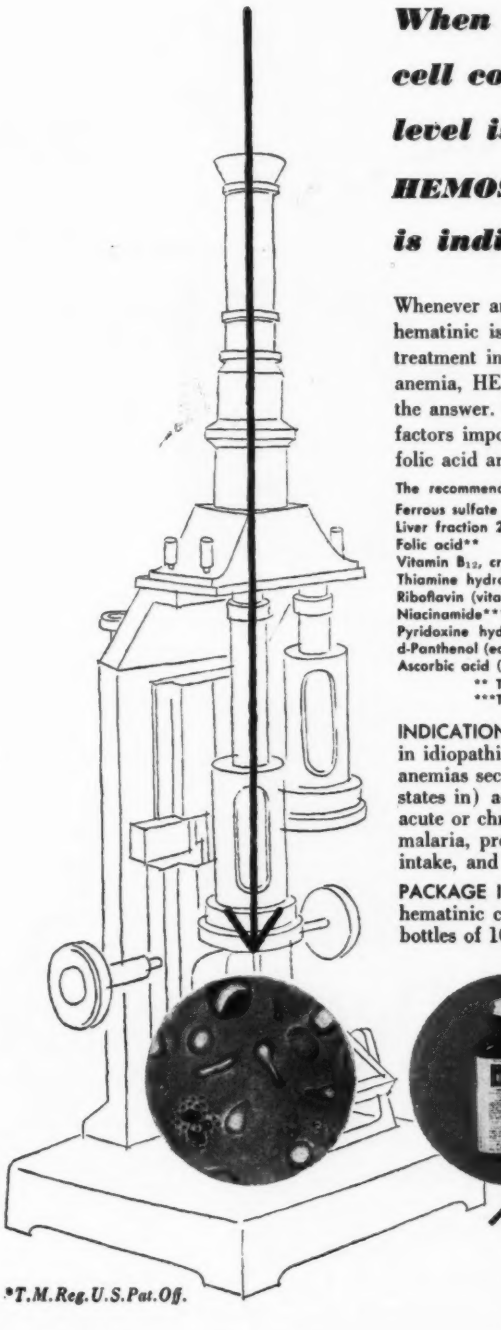
Through its inhibitory action on the nervous mechanism, Banthine reduces the vagotonia characteristic of peptic ulcer patients—the result is a consistent decrease in hypermotility and, in most instances, hyperacidity.

SUGGESTED DOSAGE:

One or two tablets (50 or 100 mg.) every six hours.

* Banthine is the trademark of G. D. Searle & Co., Chicago 80, Illinois.

RESEARCH IN THE SERVICE OF MEDICINE **SEARLE**



When the red blood cell count or hemoglobin level is too low

HEMOSULES* *'Warner'*

is indicated

Whenever an effective, reliable, and well-tolerated hematinic is required for prophylaxis or treatment in idiopathic or secondary hypochromic anemia, HEMOSULES* 'Warner' capsules are the answer. HEMOSULES* contain all the nutritional factors important to erythrogenesis including folic acid and vitamin B_{12}.

The recommended daily dosage of 6 HEMOSULES* provides . . .

Ferrous sulfate	(15 grs.) 972.0 mgs.
Liver fraction 2, N. F.	(15 grs.) 972.0 mgs.
Folic acid**	1.2 mgs.
Vitamin B_{12}, crystalline**	6.0 mcgs.
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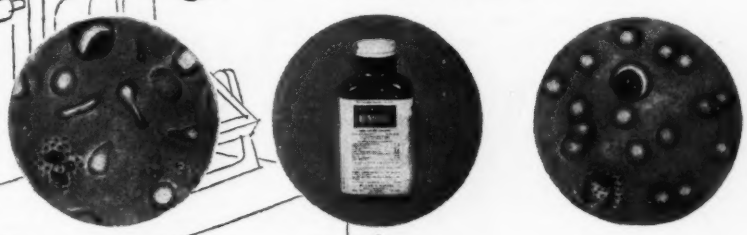

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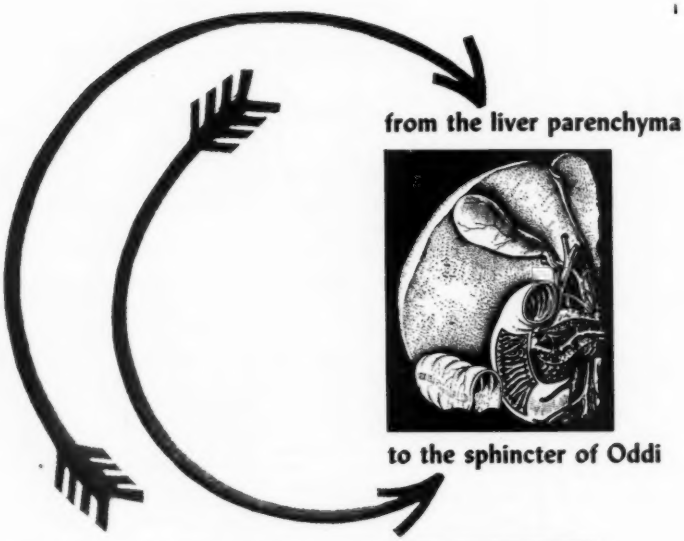

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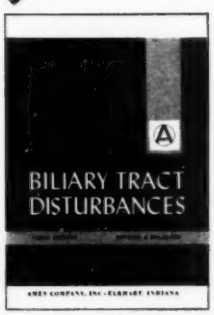

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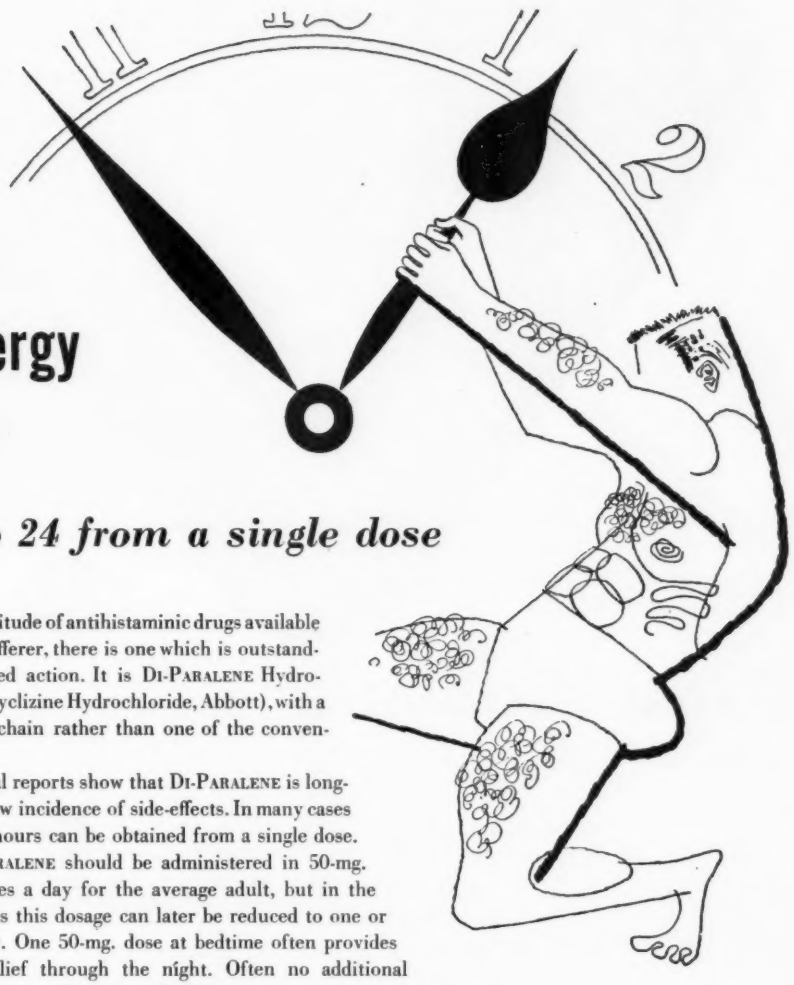

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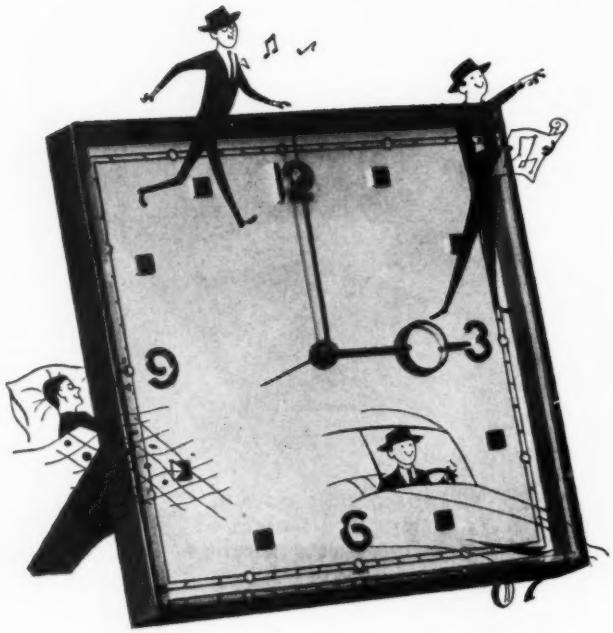

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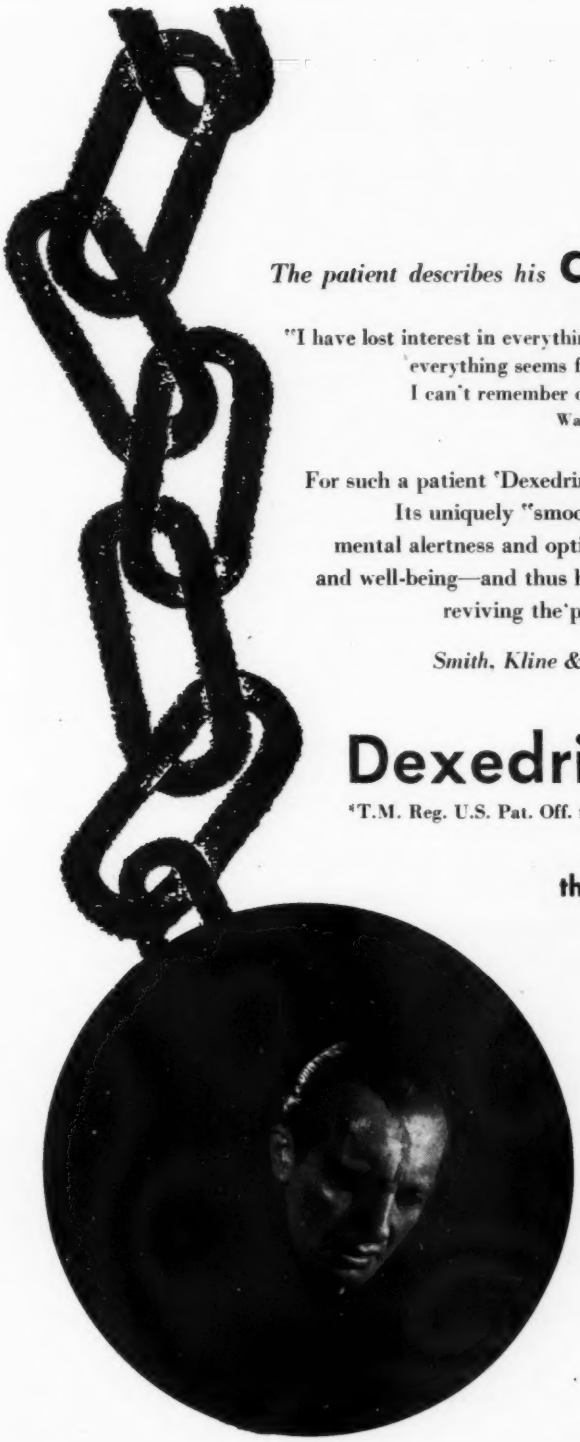

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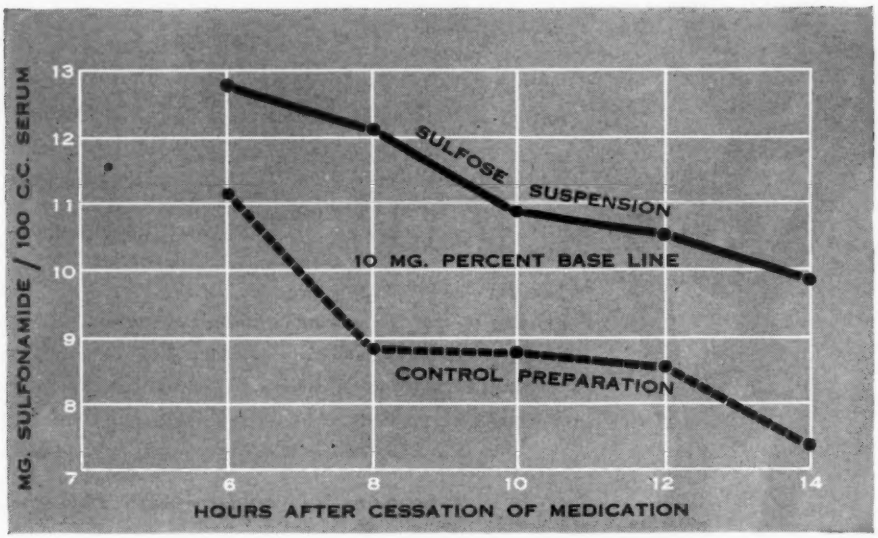

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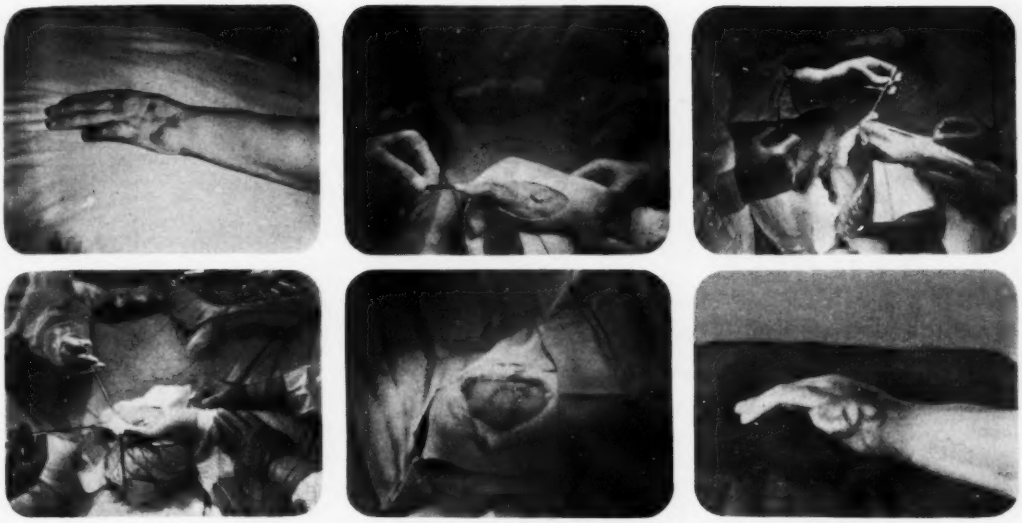

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* Patent applied for.

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Volume 44 MAY 1951 Number 5

LIPOTROPIC FACTORS IN THE TREATMENT OF CIRRHOSIS*

AN EVALUATION BY BIOPSY AND BY A STUDY OF THE PHOSPHOLIPID TURNOVER EMPLOYING RADIOACTIVE PHOSPHORUS

By JEROME O. WILLIAMS, M.D.,
DAVID CAYER, M.D.
and
W. E. CORNATZER, Ph.D.
Winston-Salem, North Carolina

Many biochemical procedures have been used in the attempt to determine the degree of liver impairment and to estimate the functional reserve of the damaged organ. In spite of the helpful information thus derived, it is recognized that many of the tests are relatively crude, that they may be at variance with the clinical findings, and that for many vital liver functions no accurate method of evaluation exists. One such fundamental function is the formation of phospholipids.[1]

Two procedures have proven of value in the study of this important phase of liver function. The first is the needle aspiration biopsy, which affords an opportunity to study the actual histologic appearance of the liver. The second is the measurement of the phospholipids entering the blood by way of the liver. This is made possible by the use of the radioactive isotope, p^{32}, which is incorporated into the newly formed phospholipids.

These procedures make it possible to investigate the following problems: (1) the relationship, in human patients, between fatty infiltration of the liver and a deficiency of lipotropic factors; and (2) the effect of treatment with lipotropic factors on the rate of phospholipid turnover and the correlation of phospholipid turnover with the amount of neutral fat in the liver, as determined by histologic studies.

MATERIAL AND METHOD OF STUDY

Twenty hospitalized patients with clinical and laboratory evidence of advanced liver disease were studied before and during treatment with lipotropic factors (methionine and choline). There were 17 males and 3 females in the group. The youngest patient was 10 years of age, the oldest 56, the average age was 39.7 years. At the time of admission to the hospital, 8 patients were jaundiced, and 11 had demonstrable ascites. The liver was palpable in all patients. Ten had palpable spleens. During the initial period of study (72 to 96 hours) the patients received no glucose, vitamins, or lipotropic factors.

Needle biopsies of the liver were done before treatment and at 2 month intervals after treatment was begun. In all instances the subcostal approach was used. The biopsy specimens were fixed in a 10 per cent solution of formalin and stained with hematoxylin and eosin.

It was noted early in the study that the presence or absence of fat could not be estimated by the size of the liver. Many markedly enlarged livers often showed only necrosis and fibrosis.

All patients were given an intramuscular injection of radiophosphorus in the form of NaH_2PO_4, and blood samples were taken routinely at 0, 24, 48 and 72 hours thereafter. The radioactivity and the amounts of lipid and inorganic phosphorus were determined and expressed in terms of relative specific activity.*

---

*Read in Section on Pathology, Southern Medical Association, Forty-Fourth Annual Meeting, St. Louis, Missouri, November 13-16, 1950.

*From the Departments of Pathology, Internal Medicine, and Biochemistry of the Bowman Gray School of Medicine of Wake Forest College and the North Carolina Baptist Hospital, Winston-Salem.

*This investigation was supported (in part) by a research grant from The Division of Research Grants and Fellowships of the National Institutes of Health, U. S. Public Health Service. The p^{32} used in these experiments was obtained from the National Laboratories, Oak Ridge, Tennessee, on allocation from the United States Atomic Energy Commission.

*The authors wish to acknowledge the technical assistance of Mr. Jesse C. Trott, Jr.

*Relative specific activity of plasms phospholipids is the ratio of the specific activity of the phospholipids to that of the inorganic phosphate.

The method has been described in detail elsewhere.[2]

The results of therapy with methionine and choline were evaluated by biopsy studies of the liver to determine the amount of fat present, and by the rate of phospholipid turnover following a large test dose of lipotropic material (10 grams of methionine or choline).

In instances where fat was demonstrable by biopsy, an increased rate of phospholipid turnover followed the administration of methionine and choline at the onset of treatment. In the patients who survived, this increase was no longer demonstrable after two months of treatment, when a second biopsy showed a decrease or absence of liver fat. An increase in the rate of phospholipid turnover, associated with a decrease in liver fat, was considered as an indication that the treatment was beneficial.

Fig. 1
Thirty-nine-year-old man with hepatomegaly and fatty metamorphosis, showing regression in liver size during eight-week interval of study.

ILLUSTRATIVE CASES

The following cases are illustrative of the results obtained.

Fig. 1 shows a 39-year-old man with hepatomegaly. The initial biopsy of the liver (*Fig. 2*) revealed marked (4 plus) fatty infiltration. Following an eight weeks' period of therapy with methionine and choline there was decided clinical improvement, and the liver had decreased in size. A second specimen taken for biopsy at the end of this interval was reported containing less fat (2 plus). The rate of phospholipid turnover before and during treatment is seen in *Fig. 3*. It will be noted that the rate of phospholipid turnover following a large dose (10 grams) of methionine was much greater before treatment than after eight weeks of treatment, when the fat in the liver had decreased.

Fig. 4 shows a 43-year-old white man who also had hepatomegaly, but whose biopsy (*Fig. 5*) at the onset of treatment showed hepatic necrosis and scarring, but no fat. The rate of phospholipid synthesis (*Fig. 6*) was unchanged after two months of treatment, although the liver had regressed in size. This decrease in hepatic enlargement was probably due to the contraction of the scar tissue.

COMMENT

Fats are not normally stored in the liver, although they are constantly being metabolized by that organ and made available for use in cell structures. Deposition of neutral fat in the liver may be produced experimentally by starvation, by a high fat, low protein diet, and by hepatotoxins. It usually takes place slowly and in association with chronic disease and malnutrition. In experimental animals, choline has been found to be effective in preventing the hepatic changes which usually follow dietary deficiencies.[4] It is believed that the efficacy of these agents is due to the formation of choline-containing phospholipids which are necessary for the mobilization

and utilization of fats in the liver. Methionine, by furnishing labile methyl groups for the synthesis of choline, acts in a similar manner. In experimental animals with fatty infiltration of the liver induced by deficient diets, an increase in the rate of phospholipid turnover has been

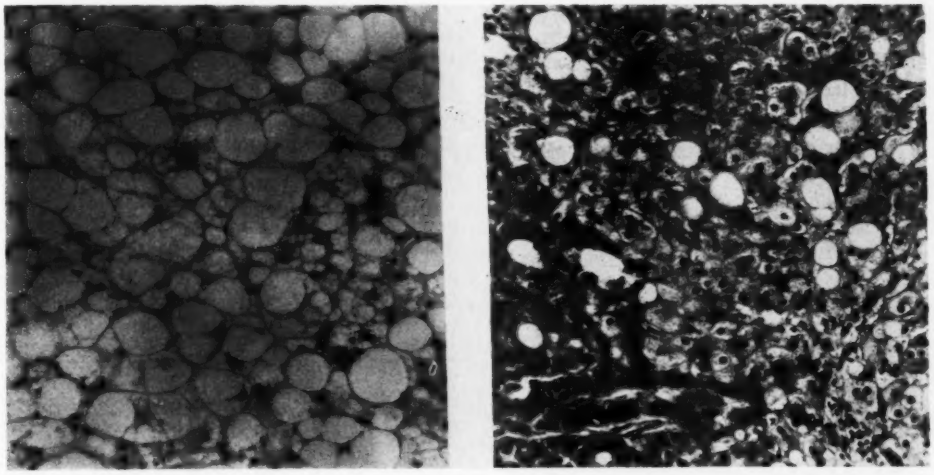

Fig. 2

Biopsies taken on admission and after eight weeks of therapy which included lipotropic agents showing marked decrease in fatty infiltration.

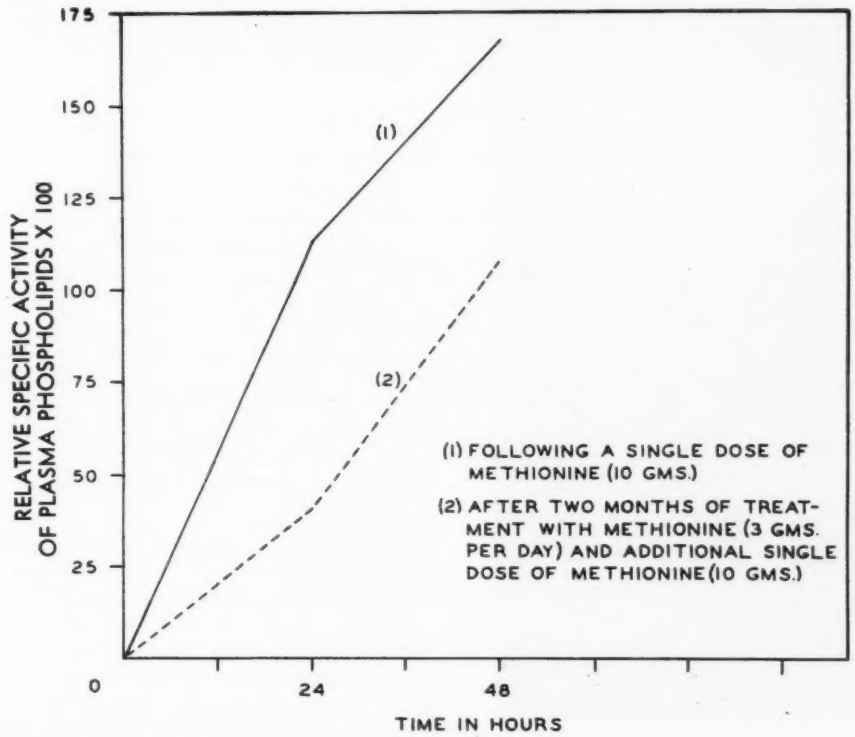

Fig. 3

Rate of phospholipid turnover with large single dose of lipotropic material before and after eight weeks of treatment. Note increased turnover when biopsy showed marked fatty change.

demonstrated following the use of choline and methionine.[5 6]

In human patients having chronic hepatitis, with or without fatty infiltration, the therapeutic value of choline and methionine has been questioned. While some observers have said that hepatic enlargement is a favorable prognostic sign in cirrhotic patients, since it often indicates fatty infiltration, which is reversible to a large degree, they feel that such patients will respond to diet alone, and that the use of lipotropic factors is of no added value in the therapeutic regime.[7] Other investigators have attributed favorable changes in the histologic appearance of the liver to the use of lipotropic factors.[8]

Fig. 4
Forty-three-year-old man with hepatomegaly. Regression in liver size during eight-week period of study probably due to contraction of scar tissue.

Since the amount of newly formed phospholipids present in plasma reflects the rate of phospholipid turnover in the liver, the incorporation of radioactive phosphorus into the phospholipid molecule offers an objective means of determining the effect of lipotropic agents. When a large oral dose of choline or an intravenous injection of methionine is given to a patient whose biopsy shows evidence of pronounced fatty infiltration of the liver, the rate of phospholipid turnover exceeds to a significant degree that found after two months of treatment, when the liver contains less fat, or none at all. The occurrence of such a response within 48 hours without other medication can scarcely be attributed to diet alone. If, however, the histologic change demonstrated at the beginning of treatment is primarily that of necrosis, inflammation, or degeneration, the administration of lipotropic materials does not affect the rate of phospholipid turnover. We have previously shown that, in normal persons, the rate of phospholipid turnover remains constant over intervals up to six months.[2]

It is always difficult to evaluate any single factor in the management of a disorder of known variability. Certainly marked improvement in liver function may follow treatment by diet alone, if the patient can be induced to ingest an adequate amount of protein. It is possible, however, that the dietary methionine may be utilized for purposes other than its lipotropic action. In view of this fact, as well as the rapid mobilization of fat which can follow the use of lipotropic material, it would seem that choline and methionine are of definite value as accessory therapeutic agents.

The period of therapy necessary to obtain optimum results is not known. In patients showing clinical improvement, who were restudied after two months of treatment, an increase in phospholipid turnover was no longer demonstrable following the administration of a large dose of lipotropic material. Thus, it would appear that these agents have their greatest value at the onset of treatment in the acutely ill, anorexic patient with fatty infiltration of the liver.

SUMMARY

The use of radioactive phosphorus and of serial needle biopsies of the liver provides an opportunity to study the effects of lipotropic agents on the rate of phospholipid turnover and on the removal of neutral fat from the liver.

In patients with fatty infiltration of the liver, the rate of phospholipid turnover following a large dose of choline or methionine is significantly higher at the onset of treatment than it is two months later when clinical improvement has taken place and the amount of fat in the liver has decreased. In patients with hepatomegaly whose biopsy shows necrosis and scarring without fat, the rate of phospholipid turnover is not increased following the large dose of lipotropic material. These findings seem to indicate that lipotropic agents are of value as adjuncts to other accepted therapeutic methods at the onset of treatment in ill patients with demonstrable fatty infiltration of the liver.

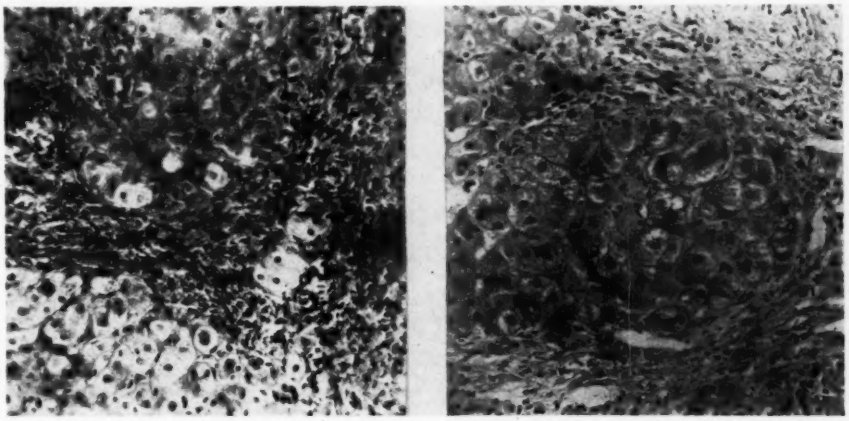

Fig. 5
Biopsies taken on admission and after eight weeks of therapy showing no change other than increased fibrosis.

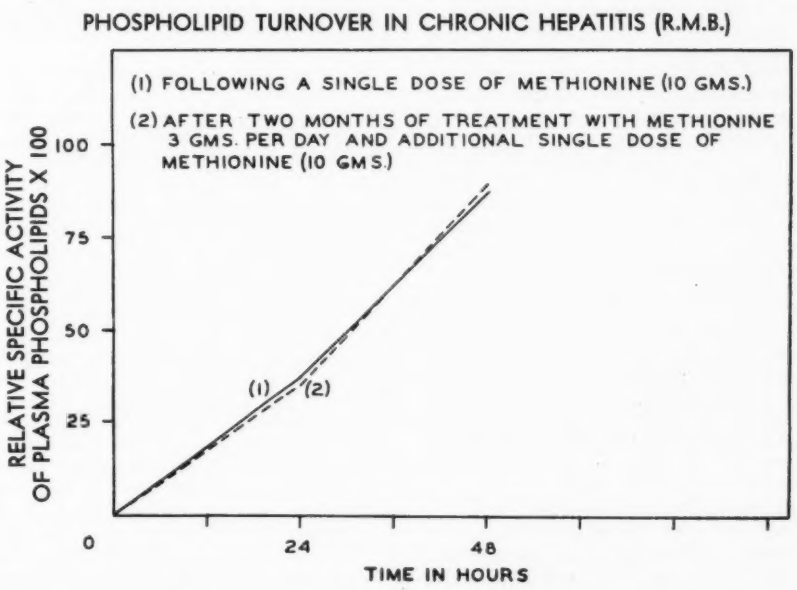

Fig. 6
Rate of phospholipid turnover with large single dose of lipotropic material before and after eight weeks of treatment. No response to methionine occurred since no fatty change was present.

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DISCUSSION (*Abstract*)

Dr. David Cayer, Winston-Salem, N. C.—I had the opportunity of following clinically most of the patients studied by Dr. Williams in the Department of Pathology. Certainly, whether or not we all agree that the histologic picture that is produced in experimental animals maintained on low protein diets, with or without the addition of hepatotoxic substances is the same as that seen in the human patient with cirrhosis, we can say that many of the things that have been found helpful in preventing this change in the livers of animals have also been of value in the treatment of human cirrhotics.

Now, in essence, our patients are similar to the experimental animals in whom this disease was induced, in that they invariably are persons who have been ingesting large amounts of alcohol and who have been on poor diets. For the most part, our patients represent acute experiments, that is, we see them before they have had any treatment and at a time when they are acutely ill. Such patients, when the liver biopsy does show fat, invariably respond with an increased rate of phospholipid turnover when they are given a large amount of lipotropic material. This can no longer be demonstrated after a period of two months. The reason these patients were restudied at two-month intervals is that the potential toxicity of p^{32} is such that we cannot use it at closer intervals. I might point out, however, that even in the acutely ill patients, including two who were admitted to the hospital in coma due to liver cell damage, the administration of a half millicurie of p^{32} did not seem to add to the amount of liver damage. There was no indication that, even in the severely ill patient, the administration of this small amount of radioactive isotope increased the amount of injury.

Since, when the studies were repeated after two months, we could no longer demonstrate an increase in phospholipid turnover after a large amount of lipotropic material, if the liver biopsy showed a decrease in the amount of fat, we conclude that in all probability the value of the lipotropic material is at the onset of the illness, particularly in the acutely ill, anorexic patient, who is unable to eat. Clinically, the cirrhotic patient who can eat derives just as much benefit from the high protein diet and vitamins that he takes by mouth as he does from the administration either orally or parenterally of a large amount of lipotropic material; but many of the patients whom we see, at least, at the time that they are admitted to the hospital, are in the most severe and acute phase of their illness and are unable to eat.

The fact that one cannot stimulate the rate of phospholipid turnover in the normal individual, that his rate remains constant over periods of at least six months, and that the cirrhotic patient whose liver can be shown to contain fat also will have an increase in the rate of phospholipid turnover after a large dose of lipotropic material, and that in one instance a patient who had marked fatty changes in the liver did not respond to lipotropic material, or diet, and expired, suggests to us that this procedure may afford not only a means of evaluating the rate of phospholipid turnover in such a patient, but it also may provide some clue as to his ultimate prognosis.

Dr. Donald H. Sutherland, Washington, D. C.—May patients have fatty infiltrations due to other causes?

Dr. Douglas H. Sprunt, Memphis, Tenn.—I should like to ask whether you had any experience of cases in which the increase of fat in the liver was due to starvation and whether the phospholipid has any effect upon that.

Dr. George T. Harrell, Winston-Salem, N. C.—I should like to ask why two of the patients who, at biopsy, had no demonstrable fat, still responded with an increase in the rate of phospholipid turnover.

Dr. Cayer (closing).—We do see patients with fatty infiltration due to other causes. We have studied a few poorly controlled diabetics, who had fatty infiltration of the liver, and apparently the same lipotropic effect holds true in these patients. We have also seen the reverse occur, that is, the patient admitted to the hospital whose biopsy was judged to show a one-plus or two-plus fat, who then left the hospital, and resumed drinking. He may return with a three- or four-plus fat, and the rate of phospholipid turnover is greater the second time, when the amount of fat is greater.

I cannot answer positively why two of our patients who, by biopsy, had no demonstrable fat, still responded with an increase in the rate of phospholipid turnover. It certainly is apparent that clinically there may not be too good a correlation between liver function tests and the clinical condition of the patient. We often see the patient improve while his liver function, as measured in the laboratory, seems to lag behind. In these individuals, one of two things has perhaps occurred: first, the biopsy may not be representative. We are dealing with a small fragment of tissue and there is always the possibility that the biopsy, at the time it was obtained, was not representative of the liver as a whole. The second thing that probably occurs is that many times we know that the fat does disappear, or at least that the methods that have been used do not demonstrate it, and we may have studied the particular individual in a transient phase when histologically we are unable to demonstrate fat, although the response to the large dose of lipotropic material is still present.

We have studied some six patients with infectious

hepatitis, and they do not, as we would anticipate, show a response to a large dose of lipotropic material. Since fatty infiltration of the liver is not a part of the pathologic picture of infectious hepatitis, these patients do not respond to lipotropic materials. That would also be in keeping with our clinical observations that the use of methionine and choline in large amounts, or over prolonged periods of time, is not of value in the patient with infectious hepatitis.

Dr. George T. Harrell, Winston-Salem, N. C.—Were fat stains done on this material and how can you be sure the vacuoles were not glycogen?

Dr. Williams (closing).—Routine hematoxylin-eosin stains were done on all the liver biopsies. Because of the small size of the specimen and the difficulty involved in frozen sections, fat stains were not done routinely on all of the specimens. We merely evaluated the fat by the presence of the characteristic vacuoles within the liver parenchyma. We did have ample opportunity to study multiple fat stains on the routine autopsy material on the patient who died. In this case we did the scarlet red, Sudan III, and the Nile blue sulfate and osmic acid. In all of these stains the material which we had been assuming to be fat could be identified as fatty tissue. Because of this experience and the experience of others we were not hesitant in considering the vacuoles in the liver to represent fat.

We also stained this material for glycogen by the Best carmine method, and iodine (Langhans method). None of the vacuoles absorbed these stains. We were therefore able to rule out glycogen as a possible cause for the vacuolations seen in the liver cells.

THE CONSTRUCTION OF AN ARTIFICIAL VAGINA*

WITH TEN YEAR FOLLOW-UP STUDIES

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The success of any operation creating a new organ depends upon the normal function of that organ many years after its construction. My experience in constructing an artificial vagina in nine patients forms the basis of this report. Five of these patients have been followed for a period of ten to thirteen years, and one patient became pregnant three times subsequent to this operation and each time delivered normally a live baby.

HISTORICAL

The first description of congenital absence of the vagina is credited to Realdus Columbus[1] in 1572. Antonii de Haen[2] was first to record an attempt to construct an artificial vagina. Although Dupuytren is universally credited as the first surgeon to perform such an operation in 1817, the honor should go to the unnamed surgeon in de Haen's writings. The evidence is so convincing that a short resume of this first operation is pertinent. The patient, a twenty-four-year-old female, had suffered from vaginal atresia for eight years and had tried in vain every sort of method to induce menstruation. The operation was planned and performed on January 25, 1761. An attempt was made to create an opening between the bladder and rectum, and it was thought by the surgeon the vagina had been penetrated, as a large quantity of black blood escaped. The patient died three days following the operation, and de Haen performed an autopsy. The postmortem examination revealed a monstrous tumor filling the entire lower abdomen. The flow of black blood seemed to come from small openings here and there in the putrid tubes, and these perforations were considered to have been the cause of death. The ovaries scarcely exceeded the usual size. The autopsy further revealed that the bladder and urethra had been perforated during the operation and that no part of a vagina was present.

Embryology.—The exact origin of the vagina is debated by embryologists. Some authorities think it is derived entirely from mullerian tissue. Others think it is derived totally from the urogenital sinus, and still others believe it is a combination of both. Novak,[3] after a careful study of Professor Robert Meyer's material on this subject, believes there is no doubt that the vagina is lined with epithelium that grows in from the urogenital sinus. By growing in, it replaces the mullerian epithelium lining the distal end of the fused mullerian tubes. Mullerian tissue is mesodermal in origin, and the urogenital sinus is entodermal in origin. Ectoderm plays no part in the development of the normal vagina. Arey[4] says that entodermal epithelium of the urogenital sinus invades the genital cord and replaces the mullerian epithelium wholly or in part.

Frequency.—The rate of occurrence of congenital absence of the vagina is not known; however, up to 1936 Flynn and Duckett[5] found 500 cases reported in the literature. Since that time approximately 250 additional cases have been recorded. A total of 100 cases have been re-

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ported from the Mayo Clinic[6] and seventeen cases by Miller[7] at the University of Michigan. Wharton[8] says that sixteen cases had been operated upon at Johns Hopkins Hospital up to 1946. Bonney and McIndoe[9] treated together and separately sixty cases. Frank[10] saw thirty cases within a twelve-year period. Read[11] reported seventeen cases seen at the Chelsea Hospital for Women over a thirty-year period. Owens[12] reported that this deformity had been noted six times at Charity Hospital in New Orleans over a thirty-four year period. Most of the patients with this deformity are reported from large teaching centers. How often the defect occurs and the patient is never examined, or if examined never reported, is a matter of speculation.

OPERATIVE TECHNICS USED TODAY

Following a long period of trial and error in the development of the most satisfactory operation for the correction of this deformity, two methods are commonly used today. One technic is simple construction of a cavity between the bladder and rectum which is kept open with some type of prosthesis to allow the epithelium to grow in and completely line the artificial cavity. This method is simply a growing-in type of operation. It is based on the principle that entodermal epithelium from the vestibule will grow in and line the vagina if the cavity is kept open. This principle was utilized by Wells,[13] Kanter[14] and Wharton[15] and is generally known as the Wharton operation. The other type of operation utilizes a split-thickness skin graft from the thigh or abdomen large enough to line the entire newly created cavity. The skin graft is placed on a mold and inserted in the new vagina. Abbe[16] first used this method. It was later perfected by McIndoe and Banister[17] and has been popularized in this country by Counseller.[18 19 20] McIndoe's main contribution to this operation was the suggestion of leaving the prosthesis in place from three to six months in order to overcome the contraction period of the perivaginal fibrous tissue.

In all cases I have used the simple construction operation which allowed the epithelium to grow in from the vestibule. Mucous membrane grafts from the medial surfaces of the labia and vestibule were placed on the end of the prosthesis in most cases. Only a few of the grafts took, and I do not feel that there is any advantage in using mucous membrane grafts. Although their use does no harm, the grafts take in such a small percentage of cases, that it is my considered opinion such grafts are useless. The most essential part of the operation is maintaining patency of the cavity after it is created. In most instances epithelium will grow in if given the opportunity. All except two of the cases reported herein have healed completely with normal mucous membrane lining the vagina. The two patients who have not healed completely are still wearing the forms, one four years following operation and one six months. Both patients are married and have normal sexual relations.

VAGINAL PROSTHESIS

Many different types of forms have been used to maintain patency of the vaginal tract, including cotton pledgets, iodoform gauze packs, wax candles, balsam wood forms, paraffin molds, pyrex glass tubes, rubber bougies, rubber sponges, lucite molds, acrylic molds and silver-plated vaginal forms. Having had experience with balsam wood vaginal forms, silver-plated forms and acrylic molds, it is my impression the type of mold makes no difference. The epithelium will grow in just as fast with one form as with another. The important detail is keeping the cavity open until epithelization is complete. Any form with a smooth surface will promote growing-in of the mucous membrane. One patient objected to the discomfort of wearing a tight belt and straps to hold the vaginal form in place. Her complaints were responsible for preparation of a new self-retaining prosthesis. In watching patients in the second stage of labor with the head crowning, it was noted that the perineum held the head back. The thought occurred that the perineal muscles would hold a properly constructed prosthesis in place in the same way. The form was made by a dental laboratory of acrylic material, and the patient has been wearing it for the past three and one-half years without complaint. She has no objection whatever to this arrangement and is willing to wear this form as long as she lives or until the cavity is completely lined. If the patient has a uterus, a similar form can be made except that it should be hollow in the center to allow menstrual egress.

Diagnosis.—The diagnosis of this condition is usually not made until the patient is past puberty and consults a physician because of failure to menstruate. If examination is done the condition may be found early. Many are never detected until marriage is contemplated or until it is ac-

tually consummated. Two of our patients with congenital absence of the vagina were married at the time we were consulted; one had been married for seventeen years.

Imperforate hymen is the most common anomaly to be confused with congenital absence of the vagina. The diagnosis will be made easily if the patient has had a few menstrual periods. Old blood can be felt in the vagina on rectal examination, and a slight bulging of the hymen will be noted. An incision through the hymen enters the vaginal cavity immediately, as the hymen is very thin. Another condition noted in infancy may be confused with congenital absence of the vagina. The labia minora may be adherent at birth and give the appearance of complete absence of the vagina. The correct diagnosis is made by careful inspection alone. In cases of congenital absence of the vagina a vestibule will be present lined with mucous membrane. If, on the other hand, the labia minora is adherent, a seam will be noted in the midline. There will be no vestibule, and the epithelium covering the area will be of the cornified type. Usually a little pressure with the thumbs on each labium minus will cause the labia to burst apart revealing the normal structures beneath.

Urological Complications.—It is mandatory that all cases undergoing surgery for the correction of this deformity be subjected to a careful complete physical examination and complete urological study. The literature is replete with congenital anomalies of the urinary tract associated with congenital defects in the reproductive system. Often an ectopic kidney is found in the pelvis and mistaken for the uterus. Without proper, thorough urological work-up, disaster may result in mistaking a kidney for a uterus or an incompletely developed uterine horn. In all of our cases retrograde pyelograms were done. In one case an ectopic horse-shoe kidney was found, and in another case a bifed ureter was present.

Pregnancy Following Operation for Congenital Absence of the Vagina.—The literature reveals only five cases in which pregnancy has followed the construction of an artificial vagina. Seven babies have been born to these five mothers. The first case was reported in 1923 by Wagner[21] of Berlin. A vagina was made for this woman by utilizing the rectum. Three babies were delivered normally through her artificially created vagina, the last of which weighed slightly less than ten pounds. The second patient who delivered a baby following this operation was reported by Whittemore[22] of Cambridge, Massachusetts, in 1942. The patient was delivered by ceasarean section one year following the operation. Read[11] of London reported two patients in 1944 who became pregnant following the construction of an artificial vagina. Both were delivered by cesarean section. In 1947, Baer[23] reported a case of full-term pregnancy following this operation. His patient was also delivered by cesarean section.

One of our patients with complete congenital absence of the vagina was operated upon in 1940 and has delivered normally three full-term living children. Adding this case, a total of six patients have become mothers of ten babies following operation for congenital absence of the vagina.

Other cases reported in the literature in which the uterus was found present and the vagina absent and in which the uterus was salvaged, making pregnancy possible, were two cases by Bonney and McIndoe[9] and one case each by Ferris[24] and Guthrie and Day.[25]

Case 8 in this series has a uterus and is men-

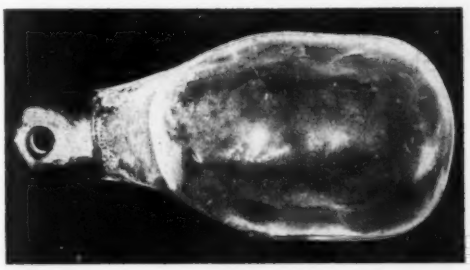

Fig. 1
An acrylic, self-retaining vaginal prosthesis. Used in *Cases 7* and *9*.

Fig. 2
End view of acrylic, self-retaining prosthesis.

struating regularly and normally since operation. Pregnancy is a probability in this patient.

Laparotomy Combined with Plastic Operation.—None of the patients in this series was subjected to laparotomy. In thin-walled individuals the presence of a uterus or parts thereof can usually be determined by recto-abdominal examination. The presence of a pelvic kidney can be determined by intravenous or retrograde pyelograms. For patients in whom the exact status of the internal reproductive organs cannot be determined, a laparotomy may be advisable in the interest of salvaging all uteri possible.

In the patient who became the mother of three children it was thought prior to operation that she had a uterus; however, at operation after dissection between the bladder and rectum for a distance of four inches, no cervix could be found, and no uterus could be palpated. A prosthesis was inserted and three months later it eroded into the cervix, and old dark menstrual blood was extruded. The uterus was found by "recovering a fumble." Although no harm was done, had a laparotomy been performed at the time of the plastic operation, the correct diagnosis would have been made. It is my belief a laparotomy scar is not so objectionable and does not require so much explanation on the part of the patient as a donor-site scar would when a skin graft type of operation is done.

Fig. 3
A hollow, self-retaining acrylic vaginal prosthesis. Used in *Case 8*.

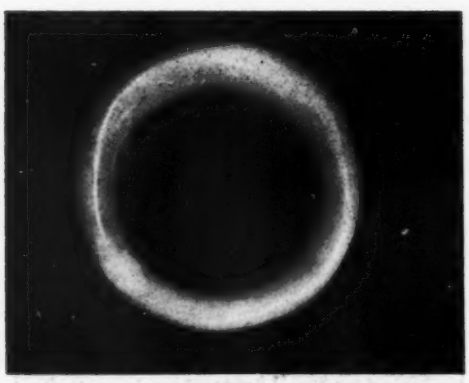

Fig. 4
End view of hollow vaginal prosthesis. This instrument is for use in the patient who has a normal functioning uterus.

CASE REPORTS

Case 1.[26]—The diagnosis was congenital absence of the vagina and uterus and ectopic horseshoe kidney. An eighteen-year-old single white woman was operated upon December 9, 1937. A simple dissection between the bladder and rectum was done, and a balsam wood prosthesis with mucous membrane grafts from the vestibule was inserted in the newly created vaginal cavity. The patient married three months after operation. Her sex life has been satisfactory to both partners for thirteen years, a letter from the patient dated October 11, 1950, reports. Dr. George Turner of El Paso, Texas, examined the patient on June 9, 1950, and writes ". . . her constructed vagina was found sufficient in size, contour, elasticity and function . . . excellent plastic result."

Case 2.[26]—Diagnosis: Congenital absence of the vagina and uterus. A twenty-year-old married colored woman was operated upon November 25, 1938. Operation was identical to procedure in *Case 1* except a silver-plated prosthesis was used. The patient began use of her vagina four months following the operation with complete satisfaction to both parties. The vaginal cavity became completely lined with epithelium in eight months. Examination of the patient in October, 1950, revealed

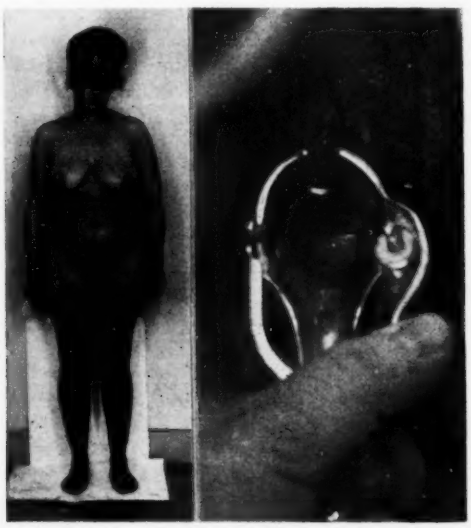

Fig. 5, *Case 2*
Left. Thirty-two-year-old colored female twelve years following construction of artificial vagina.
Right. View of interior of artificial vagina twelve years following operation, showing the vaginal cavity completely lined with normal mucous membrane.

a vagina adequate in depth, elasticity and lined with normal mucous membrane. The patient is happily married, and her sex life is completely satisfactory.

Case 3.[26]—The diagnosis was congenital absence of the vagina and uterus. A twenty-year-old single white woman was operated upon May 25, 1939, using the simple dissection technic and mucous membrane grafts on a silver-plated vaginal prosthesis. The patient married two years later and continues to be happily married to the present time. Examination in October, 1950, revealed the vagina to be adequate in depth and resiliency and lined with normal mucous membrane.

Case 4.—The diagnosis was congenital absence of the vagina. A sixteen-year-old single white girl was admitted to the hospital with chief complaint of amenorrhea. The patient was well developed and possessed all feminine characteristics. Recto-abdominal examination revealed what was thought to be a small mass in the pelvis. All laboratory work was within normal limits, including a retrograde pyelogram. The preoperative diagnosis was congenital absence of the vagina with small uterus. Operation was done March 2, 1940. A dissection was made between the bladder and rectum expecting to find a cervix. None was found and bimanual examination through the newly created cavity revealed no palpable mass identifiable as the uterus. Since no cervix could be located the preoperative diagnosis was assumed to be in error, and the usual operation was performed. The patient left the hospital on the sixth postoperative day and enjoyed an uncomplicated convalescence. On May 29, 1940, the patient passed a half teacup of old dark blood around the mold. The vaginal form found the cervix that we had failed to find. Speculum examination of the vagina revealed old blood exuding from the top of the artificially formed cavity. No cervix was visualized. A small mass that felt like the cervix was palpated. The prosthesis was kept in the vagina until September 1, 1940, at which time the vaginal cavity appeared to be completely lined with normal epithelium. In October, 1940, I entered the service, and this patient was not seen again until June 3, 1949, at which time she was approximately three months pregnant. She had married in October, 1940, and delivered her first baby in June, 1941. Her second baby was delivered in April, 1944. Both babies were delivered normally by Dr. L. P. Botta of Birmingham. The third baby, weight seven pounds and eleven ounces, was delivered spontaneously by the writer December 13, 1949. The patient has remained well and has menstruated regularly and normally since the birth of her last child. This patient is similar in every way to the case reported by de Haen.

Case 5.—The diagnosis was traumatic obliteration of the vagina due to an automobile accident at age five. An eighteen-year-old single white woman was sent to the Hillman Hospital emergency room February 27, 1939, with profuse vaginal bleeding. The vaginal hemorrhage began during an attempt at sexual intercourse. The patient said: "I felt something bust loose and immediately began to flood." At the age of five the patient was in an automobile accident and sustained several deep lacerations of the perineum by being thrown partially through the windshield. Following the accident she was operated upon twice for fecal incontinence. Her menstrual periods began at age fourteen and were always accompanied by severe abdominal cramps. Examination at the time of the profuse bleeding revealed the perineum to be scarred. Speculum examination of the vagina revealed raw surfaces on each lateral wall of the vagina three inches long and two

Fig. 6, *Case 3*

Left. Thirty-one-year-old white woman eleven years following operation for construction of artificial vagina.

Right. Interior of artificial vagina eleven years following operation, showing the cavity completely lined with normal mucous membrane.

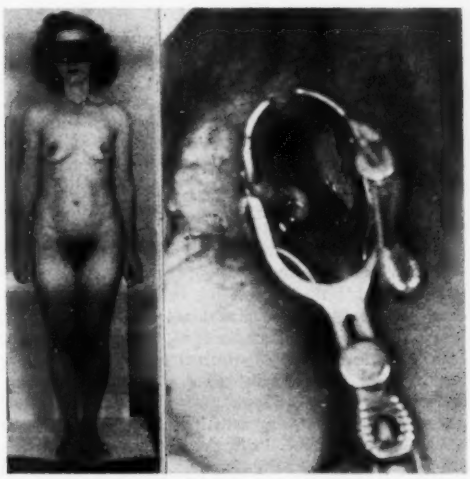

Fig. 7, *Case 4*

Left. Twenty-six-year-old white woman ten years following construction of artificial vagina. The above patient has delivered vaginally three living babies following the vaginal plastic operation.

Right. Interior of vagina. The darkened area in the center of the speculum is an eroded area on the anterior lip of the cervix.

inches wide. A large vessel on each side of the vagina in the center of the raw area was gushing blood. These vessels were clamped and sutured and the vagina packed. The following day a prosthesis was inserted. Complete epithelization had occurred at the end of three months. The patient's sexual partner created the cavity, and the vaginal mold maintained patency until the mucous membrane covered all the raw surfaces. When last seen six months following the initial examination, the vaginal cavity was completely healed, and patient said she had no more menstrual cramps.

Case 6—The diagnosis was traumatic obliteration of the vagina following delivery. A twenty-three-year-old married colored woman entered the Gynecological Clinic of the Hillman Hospital in September, 1940, for postpartum check-up. Examination revealed complete obliteration of the vaginal tract. The patient had been delivered by craniotomy July 18, 1940, following three days of labor and several unsuccessful attempts at delivery by forceps application. On September 17, 1940, a new opening was created between the bladder and rectum. The cervix was located and a hollow silver-plated prosthesis inserted. The patient has menstruated regularly following this operation and says that her sex life has been satisfactory. Examination in June, 1950, demonstrated the vaginal cavity to be lined completely with mucous membrane and normal in depth and diameter. She has not had a subsequent pregnancy.

Case 7.—The diagnosis was congenital absence of the vagina and uterus. A thirty-six-year-old married white woman was operated upon September 19, 1946. The patient had been married for seventeen years, and frequent attempts at intercourse during that time had been unsatisfactory to both parties. This patient was suffering symptoms of a "nervous breakdown" and was referred for operation. The usual operation was performed using mucous membrane grafts from the vestibule. Satisfactory sexual relations were experienced three months following the operation and have continued to the present time. A self-retaining vaginal form of acrylic material was made because the patient objected to wearing a belt to hold the form in place. The new form stays in place without difficulty and causes the patient no discomfort. Four years following this operation the cavity is still not completely healed, although the epithelium has slowly grown down the walls of the vagina. At this time a raw area at the top about the size of a silver dollar remains to be covered. It is estimated it will take another year for complete epithelization at the present rate of growth. During the past four years this patient has been examined at least once per month. Her vagina is adequate in depth and is nonpainful. Several measures to hasten epithelization have been used without apparent success. The use of theelin jelly in the vagina once each day has seemed to be most helpful. This case has demonstrated for a period of four years by actual use of the vagina that it is not necessary for the vagina to be completely lined for satisfactory sexual intercourse. The operation has restored the self-confidence and happiness of this patient.

Case 8.—The diagnosis was congenital absence of the upper half of the vagina. A sixteen-year-old single colored girl was operated upon June 10, 1947. The vagina was found to be one and one-half inches deep. A hole was noted at the apex of the rudimentary vagina through which a probe could be inserted for a distance of two inches. The cervix and uterus could be palpated on recto-abdominal examination. Intravenous pyelogram demonstrated a bifed ureter on the right. The upper half of the vagina was opened, and a dilatation and curettage were done. A hollow acrylic mold was inserted. Complete healing had occurred four months following this operation. Examination in October, 1950, revealed a normal vagina and cervix. Pregnancy is likely to occur in this case.

Case 9.—The diagnosis was congenital absence of the vagina and uterus. A twenty-four-year-old single white woman was operated upon June 5, 1950, using a silver-plated prosthesis and mucous membrane grafts. The grafts did not take. Although complete healing of the vaginal cavity had not occurred, the patient married August 11, 1950, two months following the operation. In the patient's words August 29, 1950, ". . . the operation is a complete success." A second communication October 30, 1950, echos the same enthusiasm. She is at present wearing the self-retaining prosthesis and will continue to do so until healing is complete.

SUMMARY

Nine cases of absence of the vagina operated upon by the same technic have been reviewed. Seven cases were congenital, and two were traumatic in origin. Five of these cases have been followed for a period of ten years. Of the seven congenital cases, two had uteri, and two had defects in the urinary tract. One patient has become the mother of three living children.

CONCLUSIONS

It is not necessary for the vaginal cavity to be completely lined with epithelium for satisfactory sexual relations. The older the patient is at the time of operation the longer it takes for the vaginal cavity to heal completely. The most important single feature in creating an artificial vagina is to keep the cavity open until healing is complete. A new self-retaining plastic prosthesis is described that fulfills this purpose satisfactorily.

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DISCUSSION (*Abstract*)

Dr. Grey Jones, St. Louis, Mo.—I should like to compliment Dr. Word on having a most unique experience with one of the rarer problems in gynecology. I should like also to congratulate him on the development of a simple yet exceedingly effective technic for the cure of so unfortunate a condition as absence of the vagina. Few men have been fortunate enough to have the opportunity of studying and treating nine cases of vaginal atresia and it therefore seems that we all may well profit by Dr. Word's experiences and follow his directions implicity. I intend to follow the various steps as outlined when I get such a case.

Etiologically, absence of the vagina roughly falls into two groups, namely: congenital and acquired. Five of Dr. Word's cases fall into the first category and two into the second. His treatment was the same in both groups and worked with equal effectiveness. This fact of course is good since it requires the development of only a single operative technic. The literature is replete with various methods of managing cases of vaginal atresia. Wharton and others use a prosthesis covered by skin grafts which are held in the newly constructed opening between the rectum and vagina. Frank and others describe the use of a prosthesis which acts as a sort of wedge which is held against the future opening of the vagina. Gentle pressure against this wedge over a period of time forces a deep umbilication with subsequent invagination of the surface tissues to form an artificial vaginal canal. Others have used tubular skin grafts selected from the neighboring thigh skin to line the newly created vagina and Baldwin described a technic utilizing a loop of ileum for the same purpose. All of these technics it seems to me are somewhat cumbersome and difficult when compared to the simple method which has been described for you this afternoon.

My experience with absence of the vagina consists of one patient and this case was of the acquired variety. The patient, at the age of 15 years, was brutally attacked by a sex maniac and according to her history suffered from a deep laceration of the perineum which extended the length of the vagina through the posterior fornix and into the abdominal cavity. The surgeon's note indicated that omentum was found hanging into the vagina. Further, according to the operative report, the various tissues were sutured and the patient made an uneventful recovery except that the vagina was closed along its inferior third. According to further history, several months later a hematocolpos was evacuated by reopening the vagina by blunt discission. A vaginal pack was left in place but no further attempt was made to keep the vagina open. About one and one-half years later the patient again presented herself for treatment of hematocolpos. Again the vagina was opened and dilated.

I saw the patient for the first time at the age of eighteen some three years following the initial injury. The patient was a juvenile diabetic but her chief complaint again was the inability to menstruate. Abdominally a slightly soft round mass four inches in diameter could be felt above the symphysis. Rectally a soft boggy mass about five inches in diameter could be felt in the lower part of the true pelvis. The tumor was located about two and one-half inches above the remnants of the vaginal opening. A diagnosis of acquired vaginal atresia with hematocolpos was made and plans were considered not only for relieving the hematocolpos but also for the establishment of a permanent vaginal canal.

The most logical approach it seemed to me consisted of relieving the vaginal adhesions with immediate application of skin grafts to the fresh tissue surfaces. Accordingly a solid bakelite speculum one inch in diameter was procured and the hospital engineer prevailed upon to drill numerous small holes through its entire length, this procedure being necessary for proper drainage so I thought. At the time of the operation following the reestablishment of the vaginal canal and evacuation of the liquid blood from the vagina, Thiersch grafts were recovered from the thigh and sutured with their cut surfaces externally to the outside of the perforated speculum. The speculum in the meantime had been shortened to the proper length of the vagina. The graft covered speculum was then introduced into the vaginal opening and sutured in place by heavy linen sutures placed in the neighboring labia and through holes drilled in the edge of the speculum. The inferior end of the graft was sutured interruptedly with catgut around the circumference of the introitus. An iodoform pack was placed in the tube of the speculum and a T-binder applied. An indwelling catheter was placed in the bladder and a nonresidue diet ordered. About ten days later the iodoform pack became saturated with serum and had to be removed. It was replaced by another iodoform pack under aseptic precautions. The patient cooperated

in every way possible and her postoperative course was uneventful.

At the end of three weeks, since the graft appeared to be "taking" satisfactorily at the exposed edge, I removed by a gently twisting motion the bakelite speculum. A careful inspection of the new vagina indicated that the graft was progressing satisfactorily everywhere. Subsequent follow-up examinations proved that the operation was successful in so far as a new vagina was concerned. The patient menstruated regularly and with no difficulty and the vagina remained patent for over three years or until the time of the patient's death from pneumonia.

This patient never married or had any sex experiences after the operation but I am sure that the paravaginal scar tissue formation would have made the sex act quite difficult. I intended carefully to dilate the vagina in the event of her marriage. I believe this could have been done successfully. It is evident that while the technic employed in this case of mine seemed to work fairly well it nevertheless did not bring the good results that Dr. Word has described for us and it seems to me that I made a very difficult operation of one in which the technic can be much simpler.

Dr. Word's patient 4, the one who has delivered three babies through the reconstructed vagina, interests me most. As Dr. Word points out, she was delivered twice while he was in the Army by another physician. In a conversation with Dr. Word, I got the idea that had he managed her first delivery he probably would have performed a cesarean section. I am sure I would have and I think generally speaking one would be well advised to perform cesarean section in a case of pregnancy following the creation of an artificial vagina.

Dr. M. Y. Dabney, Birmingham, Ala.—Some years ago a young woman 18 or 19 years of age was sent to me from way back in the country. Her doctor had discovered she had no vagina. I made the usual transverse incision in the perineum and with two fingers dissected inward between the bladder and rectum. I had a mechanic make a mold with metal and had it silver plated. It kept the vagina patent while healing took place. It is not difficult at all. The vagina can be made in two minutes, then the plug is inserted. I made the serious mistake of doing the operation in a single girl.

Every time she returned, the depth of the vagina had decreased as the plug pushed further and further outside. As no marriage took place, she finally removed the plug permanently and the vagina became effaced. The patient should be married or engaged to be married. Dr. Word has shown you the proper way to build a new vagina.

Dr. Word (closing).—Keeping the newly created vaginal cavity open until healing is complete is the most important step in the correction of this anomaly. If patency of the cavity is maintained, complete epithelization will eventually take place. Sexual intercourse may be practiced after all tenderness incident to the operation has subsided and before the cavity is completely lined with mucous membrane, with no injury to the healing site and with complete satisfaction to both partners.

TRANSURETHRAL RESECTION OF THE BLADDER NECK IN THE TREATMENT OF CONGENITAL ABNORMALITIES IN CHILDREN*

By J. Robert Rinker, M.D.
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Bladder dysfunction in a child always suggests the presence of a congenital malformation. Congenital bladder neck obstruction, or a neurogenic bladder due to defective innervation must be considered as possible causes. Difficulty in urination, poor stream, involuntary loss of urine, dribbling, recurrent or intractable pyuria are symptoms which should be carefully evaluated. Residual urine suggests the presence of a mechanical obstruction at the bladder neck which the detrussor is unable to overcome, or a neurogenic bladder in which the detrussor is too weak to overcome the resistance of even a normal bladder neck. Transurethral resection of the obstruction or the bladder neck to lessen the resistance at this point is rational treatment in either case.

Before treatment is begun a careful study must be made in each case and differentiation of the two conditions may be difficult. The functional bed wetter voids at intervals, while these patients tend to leak urine at short intervals or may drip urine most of the time. An x-ray showing bony defects in the sacrum suggests faulty innervation of the bladder. Mechanical obstructions may be seen by cystoscopic examination of the bladder neck and posterior urethra. Renal function can be judged in some cases by intravenous urograms and delayed films may be helpful. Cystograms help to rule out diverticula and give information as to the degree of dilatation of the bladder and whether reflux is present. If retrograde pyelograms are necessary, one side should be done at a time.

The degree of damage, elevation of nonprotein nitrogen, presence of infection, whether or not the case can be handled quickly, or whether it will be a long drawn out affair; whether to do a cystostomy and other features of the pre-

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*Author thanks the Department of Art as Applied to Medicine for making the illustrations.

Fig. 1, *Case 1*
Cystogram showing cellules and obstruction in posterior urethra.

Fig. 2, *Case 2*
Retrograde pyelogram of the right side with moderate hydronephrosis.

operative preparation will vary with the individual case.

Early treatment is important and pediatricians and general practitioners can be of great service

Fig. 3A, *Case 3*
Retrograde pyelogram showing a markedly dilated renal pelvis, kidney and ureter.

Fig. 3B, *Case 3*
Cystogram showing markedly dilated bladder.

to these patients by referring them to the urologist before marked damage has taken place. Too frequently these children are chronically ill, emaciated, and even dwarfed by the time a diagnosis is made.

Transurethral resection will cure some of these patients, and arrest the renal damage in some, but others will not be improved even after adequate emptying of the bladder has been established. Failure to respond may be due to a large tortuous adynamic ureter on one or both sides. Infection in such a kidney is difficult to treat and nephrectomy or nephro-ureterectomy may be indicated in some cases. However, nephrectomy may not be a happy choice since one is faced with the problem of conserving all of the patient's renal tissue and some corrective surgery on the ureter should be considered. Kimbrough, Orr, and others have contributed to the recent literature regarding this problem.

CASE REPORTS

Case 1.—A six-weeks-old male (*Fig. 1*) had dribbled urine constantly but never voided since birth. Kidney function was so poor that there was no diodrast® excretion in the excretory urogram. The nonprotein nitrogen was 90 mg. A cystogram showed large cellules due to constant back pressure resulting from a congenital obstruction in the posterior urethra. Kidney function improved with suprapubic drainage, reducing the nonprotein nitrogen to 28 mg., but the patient died 3 months later from pyelonephritis. On autopsy the ureters were dilated and tortuous and seemed to be plastered down in their dilated state by peri-ureteritis.

Case 2.—(*Fig. 2*) A retrograde pyelogram of the right side in an 8-year-old boy showed dilatation of the upper urinary tract. Residual urine was 125 cc., nonprotein nitrogen 72 mg., and creatinine 3.4, prior to surgery. Following resection of the bladder neck the residual urine was reduced to 15 cc., nonprotein nitrogen to 40 mg., and creatinine to 1.9 mg. The kidneys made an excellent improvement in function in this case.

Case 3.—(*Figs. 3A* and *3B*) This is a retrograde pyelogram on the right side in a 13-year-old boy. Residual urine was 40 ounces, blood nonprotein nitrogen 90 mg., and carbon dioxide combining power 34 per cent. Following resection of the bladder neck the residual urine was reduced to 7 ounces and blood nonprotein nitrogen to 42 mg. Over a period of time his residual urine reduced further to range from 0.5 to 3 ounces. Considering the severity of this lesion improvement was excellent, but unfortunately too much damage had occurred before

Fig. 4A, *Case 4*
Preoperative pyelogram showing large tortuous left ureter which is dilated and redundant.

Fig. 4B, *Case 4*
Postoperative pyelogram after redundant ureter has been excised and distal end reimplanted into the bladder.

treatment was instituted. His growth has been stunted and his prognosis is not good.

Case 4.—(*Fig. 4A*) A 3-year-old boy had a blood nonprotein nitrogen of 49 mg. per cent on admission. First attempts at catheterization failed due to a congenital bladder neck obstruction. He had 150 cc. of residual urine with infection, hydronephrosis, and bilateral hydro-ureters. A cystostomy was done and after two weeks' drainage the nonprotein nitrogen was still 47 mg. Fever due to infection of the left kidney persisted in spite of all medication though the left ureter could be catheterized easily. We decided that we could not clear up the infection without some plastic procedure on the left hydro-ureter, or removal of the kidney. A left ureterolysis and resection of the redundant ureter was carried out and the distal end reimplanted into the bladder. We were then able to control his infection and there was considerable improvement in his pyelogram (*Fig. 4B*). While he has improved clinically there is a question as to the ultimate success of the operation as he has a reflux on that side. Following his recovery the bladder neck was resected using the miniature resectoscope. He has gained weight and is a healthy looking boy as compared with his emaciated appearance on admission.

Without entering into the controversy of the dilated ureter, in the above case it appears to be the result of bladder neck obstruction, but it did not decrease in size or improve in function after the obstruction was relieved. Though the lower end was constricted for 3 cm. and thick walled as compared to the remaining upper ureter, the lumen was adequate. It appears that dilatations of the upper tract in the very young do not tend to be reversible and a plastic procedure on the ureter to conserve renal tissue in these otherwise hopeless cases is a worthy goal.

Case 5.—(*Fig. 5*) An excretory urogram of a 3-year-old boy showed "dilatation" of the upper urinary tract, and a defect in the sacrum supported the opinion that the trouble was of neurogenic origin. He had a history of recurrent bouts of urinary tract infection, and of straining to pass urine. Residual urine was 1.5 ounces, and blood nonprotein nitrogen 21 mg. per cent. Following resection of the bladder neck the patient voids easily and residual urine ranges from none to 12 cc.

Case 6.—(*Fig. 6*) This excretory urogram shows dilatation of the upper urinary tract, the same type of lesion as in *Case 5*. The patient had been dribbling urine for 4 months and was found to have a residual urine of 700 cc.; a defect in the sacrum supports the diagnosis of a neurogenic bladder. Following resection of the bladder neck the patient voided normally and his residual urine was reduced to 50 cc.

During the postoperative period when the bladder is very large and atonic, it is well to have the patient empty the bladder at short intervals by the clock rather than on the impulse to void until the bladder regains its tone. Mecholyl® may be helpful in some cases.

Fig. 5, *Case 5*
A defect in the sacrum is noted, suggesting neurogenic defect causing dysfunction of the bladder.

Fig. 6, *Case 6*
Note congenital defect in the sacrum. Moderate hydronephrosis is also noted.

CONCLUSION

Cases are presented showing the severe damage which takes place when the bladder does not empty because of a congenital malformation. Transurethral resection with the miniature resectoscope is of proven value in such cases. In some cases additional surgery of the upper urinary tract may be considered in the salvage of these patients.

406 University Hospital

DISCUSSION (*Abstract*)

Dr. Otto J. Wilhelmi, St. Louis, Mo.—The thing of paramount importance in Dr. Rinker's paper is that all of these bladder neck obstructions are congenital in origin. As a matter of fact it has been conclusively shown that they exist even before birth, often occurring as early as the fifth or sixth month *in utero*. So the child may have an obstructive process going on with subsequent renal destruction 3 or even 5 months before he is born. The interesting feature of this anomaly is that these conditions are not identified and brought to the physician's attention until after the first or second decade and in the interim the renal destruction has become so great that the kidneys can no longer be salvaged. The patient may have been too young to remember his symptoms but his mother will recall that in infancy he had enuresis, frequency, dribbling and tenesmus of such severity that he cried every time he voided.

Various kinds of lesions cause obstruction at the bladder neck: (1) Valves occurring in the pre- or postmontanum area are often etiologic factors. When the urine flows against the valves it causes them to dilate or balloon out which of course impedes the flow of urine through the urethra. Occasionally they act as ball-valve affairs which completely obstruct the urine. (2) Another cause is a growth of tissue in the midline, called a median bar. These bars often contain a minimum amount of tissue but are sufficient impediment to cause back-flow. (3) There are also the neuromuscular obstructions. The bladder may be spastic or atonic and greatly dilated. The detrusor fails and as a result one gets a large residual which may be accompanied by regurgitant urine and kidney destruction. There are certain precautions that should be taken before attempting any corrective bladder neck surgery.

First, be sure there is actually bladder neck obstruction before doing surgery. It could be ureterovesical or uretero-pelvic in nature. Second, be quite certain that the relief of this obstruction is the key to the prevention of further renal destruction.

The amount of tissue to be removed is often only a minimum to assure good results. Often, merely shaving off the surface with a Bugbee electrode will suffice or a few linear incisions will do the trick.

I have two cases, both bladder neck obstructions, which acquired different results. X-rays showed a 37-year-old man to have 1,500 cc. of residual urine, and an 11-year-old boy to have 450 cc. of residual. The older patient had a complete recovery after only 6 grams of tissue were taken out, while the younger 11-year-old boy progressively became worse after his resection, his nonprotein nitrogen continued to rise and in 5 months he died.

Why can some make a renal comeback, while others, even with youth as an added factor, cannot? Again, why do some cases show renal reflux and others show no regurgitation?

Dr. John H. Dougherty, Knoxville, Tenn.—This phase of urology offers the opportunity to apply the principles and conservation. It is up to us to concentrate our studies on children and to cooperate with the pediatrician and general practitioner in every way possible to save these children. In my town the general practitioner, more than the pediatrician, most often sees the children who are afflicted with urologic abnormalities. Many persons have the idea that the genito-urinary system is as simple in its operation as the plumbing system in a house and that every child has a completely normal setup to begin with and that the only afflictions which appear come after birth. This, of course, is a fallacy. I believe sincerely that the urologist when he sees these children should cystoscope them and study them by all means at his disposal, for only by doing so can he ferret out the often minute abnormalities which will cause their trouble and eventually lead to renal destruction. Observation of the upper urinary tracts from the bladder will often yield surprising and interesting information as to the physiologic function and the aberrations from normal.

Dr. Rex E. Van Duzen, Dallas, Tex.—Some of these cases are relieved by resection of the vesical neck, as Dr. Rinker has suggested, while others are not.

A boy of three or four, feeble-minded, was referred to us from one of the orphanages with complete retention of urine. He was sent in with a large mass in the left lower quadrant which was found on cystoscopy and x-ray to be an enormous dilated left ureter. In fact it was considerably larger than the bladder. On looking into the deep urethra we saw cusps extending back from the vera towards the bladder and they were ballooned upon filling the bladder. These were destroyed by fulguration, and following this the mass disappeared. Instead of being a case of retention, it became one of incontinence. This continued for a month or more without any improvement. Following resection of the presacral nerve the boy again regained continence.

Another case was a child of six months who was seen in the clinic. The urethra would admit only an F6 ureteral catheter. He had an enormous bladder by cystogram. Since the urethra would not admit the smallest cystoscope, we attempted an excretory pyelogram but this was unsatisfactory and it was not until autopsy that we found the true condition. At that time we found a tricuspid valve arrangement in the midportion of the pendulous urethra and the urethra behind this was markedly dilated. There was also a similar valve-like arrangement in the intramural portion of both ureters, especially the left. There has been considerable discussion as to whether the ureteral condition was the primary cause of the trouble or whether both the ureter and urethra were contributory causes to his marked azotemia and subsequent death. Resection or destruc-

tion of the urethral valves certainly would not have relieved the azotemia in this case, and it is probable that had we been able to diagnose the case at the outset with a pyelogram, subsequent destruction of the valves in the intramural portion of the ureters and in the urethra might have offered some hope of improvement. However this patient was damaged beyond any hope of recovery when we first saw him.

Dr. Elmer Belt, Los Angeles, Calif.—It is wonderful to see a child with an otherwise fatal urologic lesion grow up and become normal as the result of proper urologic treatment.

In Dr. Rinker's first illustration, I wonder whether you noticed that the posterior urethra is funnel-shaped where his catheter enters the bladder. The distal portion of this funnel indicates where the valve is. There are many types of valves. We have seen cup-shaped valves and circular-shaped valves with tiny perforations in their middle. All valves produce this funnel-shaped posterior urethra. When the ureterovesical orifices remain open and the ureters fill with the opaque medium as a cystogram is made, a diagnostic picture is produced showing these spiral twists. This is very interesting to me because a long time ago, in San Francisco, I reduplicated these spiral twists in hogs. Working at the Poor Farm in San Francisco, I ligated the ureter on the one side in a series of pigs who later were to come to slaughter. The ligation was carried out when the pigs were young. Later when the hogs came to slaughter I obtained the specimen and saw this process in its various stages.

It is easy to understand what happens to the ureter by taking a child's long balloon and inflating it. As the balloon is inflated it grows longer as it gets larger in diameter. The ureter enlarges in the same way. Since the ureter has no room in which to lengthen, it is obligated to rotate into spiral twists as it enlarges. These twists always occur in pairs. The repair of this lesion can be effected only if each bend in the ureter is removed and the straight segments remaining are united end to end. The bends in the ureter are bound together with adhesive bands which makes it impossible to straighten the ureter in these areas.

Unfortunately even when back pressure in an already severely damaged urinary tract is completely relieved the child may not get well. Dr. Rinker has emphasized this point.

An explanation may be found in the work of Jean Oliver. Many years ago Dr. Jean Oliver produced kidney lesions closely resembling nephritis by injecting a very small amount of potassium bichromate directly into the renal artery of one kidney. Thus a unilateral type of nephritis was produced. In these experiments the connective tissue framework of the kidney which encircles all of the units of the kidney structure in corkscrew-like fibrils ultimately shrinks down and chokes off the blood supply to the delicate renal epithelium.

A similar intense fibrosis afflicts the renal tissue in some of these hydronephrotic kidneys in childhood. When such a fibrosis occurs function of the kidney is slowly and steadily shut off. The lesion is not reversible. We have not been able to learn why this fibrosis occurs in one case of urinary obstruction in a child and dose not occur in another.

Dr. Nelse F. Ockerblad, Kansas City, Mo.—I have been working long enough to see these patients as grown up men and women coming back to me after years of being cured. They respond well to surgery and are able to recover nearly normal function.

Pediatricians frequently are satisfied when they see pus disappear from the urine under medical treatment with antibiotics. This is not always the answer to the problem. The great variety of obstructive lesions about the bladder neck in infants and children presents a very interesting diagnostic problem.

Dr. Rinker (closing).—Our experience in reading cystograms of six-weeks-old children has been somewhat limited. The autopsy in the case reported did not show a valve because we had already obliterated the valve surgically a few weeks before the child died, so you will have to accept the statement that it was present on the basis of our cystoscopic examination. We were unable to see whether our operation was of any value or not.

A SIMPLE SURGICAL TECHNIC FOR THE TREATMENT OF NONUNION*

By MAURICE B. ROCHE, M.D.
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and
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Intramedullary, inlay and onlay placement of bone grafts constitute the generally accepted methods for the successful repair of nonunion in long bones. While the intramedullary bone grafts have largely been abandoned because of the frequent failure for the nonunion to heal thereafter, a modified form of this technic, the sliding bone graft, has offered a somewhat better incidence of success. The inlay graft requires a greater amount of technical effort and precision, and in capable hands has proven a satisfactory method. Albee was an enthusiastic exponent of this method. But perhaps by far the most extensively employed technic is that of the application of onlay grafts to the site of nonunion.

The onlay graft was so described by Campbell,[1] who held that the successful treatment of nonunion depended upon two factors: absolute

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fixation and the promotion of osteogenesis. These, he originally maintained (Harkins and Phemister[2] 1937), were best secured by the use of a full thickness cortical graft pegged in place by autogenous nails and supplemented by spongy bone packed around the ends of the fragments. Henderson[2] preferred a massive graft; hence the term massive onlay graft. In addition Henderson also described the use of small pieces of cancellous bone packing about the fracture line and the line of contact of the graft with the fragments. The fracture itself was exposed, the eburnated ends were removed and the medullary cavities in each fragment opened up. The grafts were held firmly to the fragments by some form of internal fixation, and external fixation was further provided by the application of a plaster cast.

These principles are essentially maintained in most present day technics. There have been many variations employed, especially since the introduction of inert metal. In some instances the intramedullary, inlay and onlay concepts have all been combined in one procedure. Dual massive onlay grafts have been used, as well as the combining of a massive onlay graft with a metal plate, and the use of dual metal plates has been more recently described. It has been observed that some of the technics represent complex operations, that there is a great deal of trauma to the bones and tissues on occasion, that some are technically difficult and prolonged, and that certainly the incidence of hemorrhage, shock and infection is greater than when simpler procedures are employed.

In the method herein described, the two factors pointed out by Campbell, absolute fixation and the promotion of osteogenesis, have been of primary consideration. Campbell, in order to obtain absolute fixation, employed a full thickness cortical graft pegged in place by autogenous nails. Henderson,[2] in pointing out the need for both internal and external fixation, observed:

> "There comes a weak period in the growing and healing period of a fracture and graft usually at about the end of the sixth or seventh week. The graft is weakened by some absorption and enough new bone has not as yet formed to give strength."

For this reason, the authors have preferred the use of a metal plate rather than a bone graft as a means of securing rigid fixation of the fragments. Bone grafts have been used only for the function of osteogenesis. These grafts are routinely taken only from the outer cortex of the ilium. Hence they are not so massive as would be those including the full thickness of the ilium. Again, they are not fastened to the host bone by any means of internal fixation but are freely laid in the subperiosteal bed, along the shafts of the fragments and across the fracture line. This method has been used only in selected cases of nonunion and is not presented as adaptable for employment in every case of ununited fracture. It has never been employed, for instance, in cases of nonunion associated with large bone defects or cavities. Those cases successfully treated do include, however, a series of pseudarthroses, and instances of nonunion with marked angulation, soft tissue interposition, and bulbous sclerosis of the fragment ends.

PREOPERATIVE PREPARATION

The duration of the period of preoperative preparation is not a fixed one and depends upon both the general condition of the patient and the condition of the local fracture area. The patient is freed as far as possible from any constitutional impairment, and indicated treatment may include the administration of vitamins, blood transfusions, antibiotics, heliotherapy, and physical therapy. In many instances, these patients have undergone several previous attempts at surgical repair of the fracture site, have been immobilized for prolonged intervals in casts, and their skin has accumulated a thick, dry coating of cellular debris. Such skin is treated and reconditioned by means of repeated gentle cleansings with one of the newer detergent soaps. Just prior to the operation, the intravenous administration of saline is begun and whole blood is immediately available. If the fracture site involves a lower extremity, particularly the femur, the patient at the time of operation is placed on a fracture table, and traction applied when indicated. Antibiotics are administered several days before operation.

OPERATIVE TECHNIC

The employment of two teams is an advantage, one to secure the grafts and the other to prepare the fracture site. The fracture site is approached (*Fig. 1*) through an adequate incision, through intermuscular planes when possible, and hemostasis is effected by means of the spark cautery. The use of the latter should always be made known to the anesthetist before the operation is begun. The fragments are cleared by subperiosteal dissection completely encircling

the ends of the bones but with minimal exposure of the shaft. All fibrous callus is removed, the ends are freed from terminal sclerosis, and the intramedullary openings are drilled into several times. The ends are evenly apposed even if remodeling is necessary (*Fig. 2*). These are held in accurate reduction by means of a metal plate. In the majority of cases we have used the Townsend and Gilfillan slotted plate. After the plate is thus made secure, the subperiosteal bed about the bone is ready for the multiple grafts.

The wing of the ilium has been exposed in the routine manner except that the intra-abdominal area has not been exposed. The attachment of the abdominal muscles is not disturbed. Rather only the crest is exposed as well as the outer cortex of the ilium. And grafts which include only the outer cortex of the ilium plus a thin surface of the cancellous bone are removed. Three moderately large grafts of this type are removed never approximating more than 2.5 x 12.5 centimeters in size. Then long curls of cancellous bone are removed with a gouge in such quantity as is available.

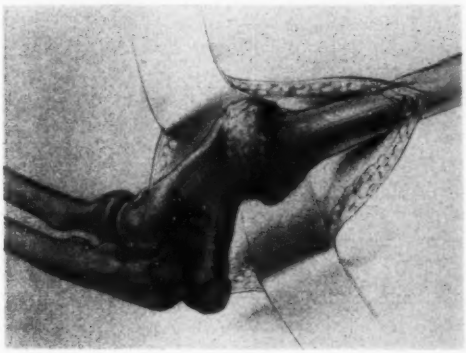

Fig. 1
The fracture site is approached through an adequate incision, through intermuscular planes when possible, and hemostasis is effected.

Fig. 2
The ends are evenly apposed even if remodeling is necessary. These are held in accurate reduction by means of a slotted metal plate. After the plate is made secure, the subperiosteal bed about the bone is ready for the multiple grafts. These, taken from the outer cortex of the ilium, are pressed against the shaft surfaces by closing over them the periosteum and muscles by means of interrupted sutures.

The fracture site has been fixed securely and accurately by the metal plate. The three remaining sides have been evenly leveled and freshened by means of a chisel and alongside these areas the three large bone grafts are laid, paralleling the shaft and crossing the fracture site. Then the curls of cancellous bone are packed into the space between the fracture ends and along the edges of the grafts. Thus properly placed in the subperiosteal bed, the grafts are pressed against the shaft surfaces by closing over them the periosteum and muscles by means of interrupted chromic catgut sutures. Careful closure of the wound in layers is followed by a mild pressure dressing consisting of gauze flats and elastoplast, the latter only half encircling the limb. A plaster cast of such proportions as are indicated is then applied. Antibiotic therapy is resumed for a time postoperatively.

CASE CITATIONS

Case 1.—Pseudarthrosis of the left humerus. G. H., a 29-year-old white man, was admitted on August 2, 1948, because of an acquired deformity of the left arm. He had sustained a compound comminuted fracture of the left humerus as well as an accompanying injury to the radial nerve in 1944 while in the service. There was an initial operation for repair of the nerve, the date of which he could not recall. A second operation followed in September 1944, which was an open reduction of the humeral fracture with the application of a tibial bone graft. He was discharged from the service in 1945 with a nonunion of the left humerus. The admission physical examination revealed a flail pseudarthrosis of the left humerus with 90 to 180 degrees of motion at the fracture site. There was 20 to 30 degrees of motion at the elbow joint. All the muscles supplied by the radial nerve had residual weakness and there were sensory changes along the course of the superficial radial nerve. The left hand was held in radial deviation in consequence of weakness of the extensor carpi ulnaris. Radiographs showed an old nonunion at the distal third of the humerus, the distal fragment being quite short and angulated anteriorly (*Fig. 3*). Three metallic screws and metallic fragments were seen about the fracture site. On September 4, 1948, four years after the last operation, an open reduction was performed, the fracture fragments were cleared of callus and fixed with a T and G slotted bone plate and multiple free lying iliac bone grafts were inserted about the fracture site. The arm and forearm were immobilized in a long plaster cast with the elbow flexed 90 degrees. A shoulder spica was not applied because of the metal fixation. At the end of 3½ months, radiographs showed sufficient callus formation and clinically the fracture was solid. The elbow was placed at 90 degrees of flexion

and 15 degrees of extension was possible. On February 24, 1949, plaster immobilization was discontinued and the arm fitted with a brace consisting of a leather cuff fitted well about the entire arm, another fitted about the forearm and the metal side supports having a fixed connection at the elbow. After an additional four months he was allowed to discard the arm brace. The fracture site continues solid to date (*Fig. 4*).

Case 2.—Nonunion of the right humerus, dislocated radial head, non-union both bones of the forearm. J. F. P., a 31-year-old white man, was admitted on September 29, 1946, following a car accident in which he sustained multiple injuries to the right upper extremity. Radiographs revealed a comminuted fracture of the middle third of the right humerus, a comminuted fracture of the upper third of the right radius and ulna, and a dislocation of the head of the right radius. Following admission a pin was inserted through the right olecranon and another through the distal ends of the right ulna and radius. Skeletal traction was then applied to the fractures of the right arm and forearm bones. When the fractures were properly lined up, a body jacket cast was applied incorporating both pins. At the end of 6 months, radiographs showed no evidence of healing at any of the fracture sites (*Figs. 5* and *6*). On March 22, 1947, 6 months after the original injury, an open reduction was performed on the right humerus and the fracture fragments were fixed with a T and G slotted bone plate and multiple free lying iliac bone grafts were inserted. The extremity was then immobilized in a shoulder spica. A partial radial nerve paralysis developed postoperatively which completely cleared in 4 months. One month fol-

Fig. 3

Case 1.—G. H., a 29-year-old white man, had a compound comminuted fracture of the left humerus with radial nerve injury, 1944. The first operation was radial nerve repair in 1944; the second, open reduction with tibial bone graft and screw fixation, September 1944; and the third, open reduction using the simplified technic four years after fracture.

Preoperative anteroposterior and lateral views.

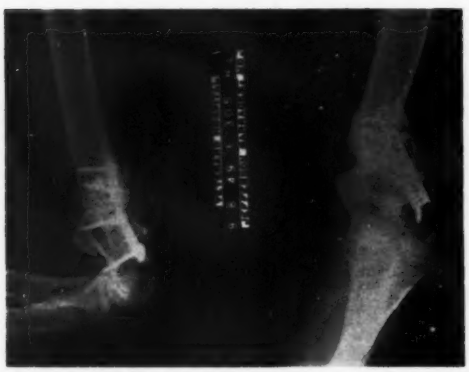

Fig. 4

Case 1.—G. H. Anteroposterior and lateral views one year following operation.

Fig. 5

Case 2.—J. P., a 31-year-old white man, sustained simple comminuted fractures of the right humerus, ulna and radius, September 29, 1946. Nonunion involving all three bones resulted. Open reduction of the humerus 6 months, of the ulna 7 months, and of the radius 14 months after the accident, were performed using the simplified technic.

Preoperative anteroposterior and lateral views of the right humerus show nonunion.

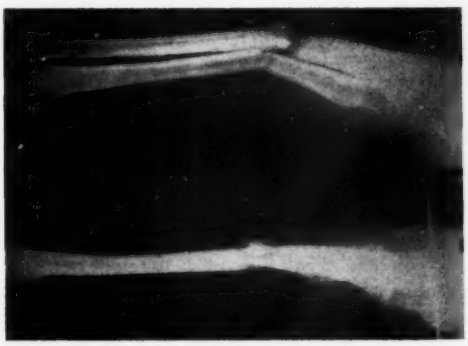

Fig. 6

Case 2.—J. P. Preoperative anteroposterior and lateral views of both bones of right forearm.

lowing the initial operation, on April 15, 1947, an open reduction was carried out on the right ulnar fracture, fixation by metal plate and bone graft insertion following the same procedure as on initial surgery. The head of the radius was also removed at this time. The right upper extremity was again immobilized in a shoulder spica for an additional 3 months. Radiographs taken 4 months after the first surgical procedure revealed good callus formation at the fracture sites of the right humerus and ulna, but no evidence of union at the fracture site of the right radius. The patient was then fitted with an arm and forearm brace. Examination prior to discharged revealed normal motion at the right shoulder joint; elbow motion was possible from 75 to 150 degrees; pronation and supination were markedly limited, and wrist motion consisted of 40 degrees of dorsiflexion and 50 degrees of palmar flexion. The patient was readmitted 11 months later and on November 6, 1948, a third open reduction was performed, this time on the fragments of the right radius. Here again, the fracture site was immobilized with a T and G slotted bone plate, and multiple free lying iliac bone grafts were inserted subperiosteally about the site. Postoperatively, the right arm and forearm were immobilized in a long cast with the elbow flexed 90 degrees for a period of 6 weeks. This was followed by further immobilization in an arm and forearm brace for an additional 3 months. All sites maintain bony union to the present date (*Figs. 7* and *8*).

Case 3.—Nonunion of the tibia. J. L., a 29-year-old white man, was admitted on May 8, 1946, two days after having been hit by a car, as a transfer patient with a diagnosis of simple, oblique fracture of the middle third of the left tibia and fibula, and severe cerebral concussion. The patient was in a comatose condition at the time of admission and it was not until three weeks later that the Surgical Service was able to perform an open reduction. This was on May 29, 1946, at which time the tibial fragments were fixed with a single metal screw and the leg was immobilized in a long plaster cast. Four months later, the radiographs showed no evidence of callus, the fracture lines were as distinct as originally and clinically the site was abnormally mobile. Four months after admission, he was transferred to the Orthopedic Service and a second open reduction was performed on September 7, 1946. The patient had been a prisoner of war in a Japanese prison camp for 3 years, had had ten exacerbations of malaria while in the service, and the radiographs of his bones showed a degree of atrophy far in advance of the degree that four months of disuse would produce. At operation the cortex of the tibia was found to be paper thin, and there was no cancellous bone to be found in his ilium. As a matter of fact, in this instance, it was not possible to select the outer cortex of the ilium, since both cortices were continuous, there being no cancellous bone. Nevertheless the tibial fragments were properly aligned after freshening their ends, and fixed with a slotted T and G bone plate. Multiple free lying iliac bone grafts were inserted subperiosteally about the fracture site and the periosteum and muscles sutured over them. Postoperatively, the left leg was immobilized in a long cast for a period of 5 months, followed by an ischial weightbearing brace for an additional 6 months. A solid union resulted.

Case 4.—Nonunion of both bones of the forearm. C. D., a 25-year-old white man, was admitted as a transfer patient on July 28, 1947, 6 weeks after suffering a compound, comminuted fracture of both bones of the left forearm, as a result of a sideswipe injury when a truck hit his left elbow and forearm (*Fig. 9*). He was treated at a hospital in Jefferson City by skeletal traction through a pin in the left olecranon and another through the metacarpals of the left hand. He was transferred thus, 6 weeks after the original injury, to our hospital with a long cast incorporating both pins and with the elbow fixed at 90 degrees flexion. Radiographs revealed a comminuted fracture of the middle third of the left radius and ulna. The ulnar fragments were in satisfactory position and showed evidence of callus forma-

Fig. 7
Case 2.—J. P. Anteroposterior and lateral views of the right humerus 3 years following operation.

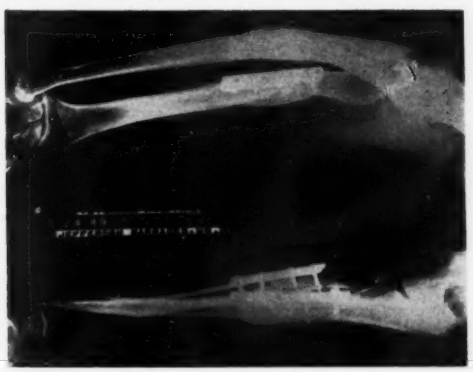

Fig. 8
Case 2.—J. P. Anteroposterior and lateral views of right radius 18 months following operation.

tion. The radial fragments were displaced and showed some evidence of callus formation. Immobilization was continued for an additional 3 months in a long plaster of paris cast. However, at the end of that period of time, radiographs showed no evidence of further callus formation and clinically the fractures of the forearm were not united. On October 16, 1947, 5 months after the original injury, an open reduction was performed. The fragments of the left radius were cleared of fibrous callus, reduced and fixed with a Collison plate. Thereafter, multiple free-lying iliac bone grafts were inserted along the shafts of the fragments crossing the fracture line. Cancellous curls were packed into the fracture line and alongside the grafts. The fracture site of the left ulna was cleared of callus and several iliac corticocancellous grafts inserted in the subperiosteal bed. Postoperatively, a long plaster cast was applied, immobilizing the left arm and forearm with the elbow flexed at 90 degrees. Immobilization was continued for a period of 3 months, at the end of which time radiographs showed osseous callus at the fracture sites and clinically they were united (*Fig. 10*).

Case 5.—Nonunion of the femur. L. J. P., a 33-year-old white man, was admitted as a transfer patient on May 25, 1947, with a history of having sustained a compound comminuted fracture of the middle third of the left femur in a car accident on January 31, 1947, approximately 4 months prior to entry. The patient had been treated conservatively at the other hospital with balanced traction through a supracondylar pin in the left femur for a period of 8 weeks. This was followed by a one and one-half spica for 7 additional weeks. Physical examination of the left lower extremity revealed a healed scar over the midportion of the left thigh. There was abnormal mobility in the midportion of the left femur. There was motion of 10 degrees in the left knee from a position of full extension. Radiographs revealed an oblique fracture of the middle third of the left femur with the distal fragment displaced anteriorly and medially about 2 centimeters. There was evidence of callus on the medial side of the proximal fragment (*Fig. 11*). However, the ends of the fragments were smooth and rounded. On June 26, 1947, 5 months after the original injury, an open reduction was performed. Intervening soft tissue was cleared from the fragments, reduction effected, and the freshened ends were then fixed with a T and G slotted bone plate, and multiple free lying iliac corticocancellous and cancellous bone grafts inserted in the usual manner. Postoperatively, the left femur was immobilized in a one and one-half spica for a period of 3 months. This was followed by an ischial weightbearing brace for an additional 10 months. Motion in the knee following complete union and rehabilitation consisted of 90 degrees of flexion from full extension. Other joints in the lower extremity were of normal range (*Fig. 12*).

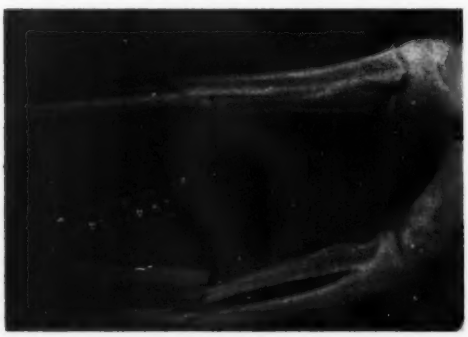

Fig. 9

Case 4.—C. D., a 25-year-old white man, sustained compound comminuted fractures of the left radius and ulna June 4, 1947. Open reduction for nonunion of both bones was done 4 months later, using simplified technic on the radius and only an iliac graft on the ulna.

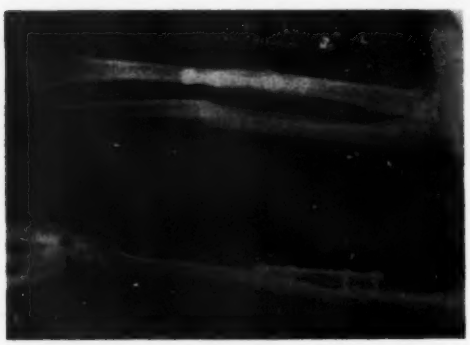

Fig. 10

Case 4.—C. D. Anteroposterior and lateral views of left radius and ulna 7 months following operation.

Fig. 11

Case 5.—L. P., a 30-year-old white man, sustained a compound fracture of the left femur on January 31, 1947. Open reduction for nonunion was performed 5 months later using simplified technic.

Preoperative anteroposterior and lateral views of left femur.

DISCUSSION

In 1920 Delangeniere and Lewin[3] published a general method of repairing loss of bony substance and of reconstructing bones by the use of osteoperiosteal grafts. It was described as consisting not only in grafting bones and periosteum but also in transplanting into the defect all the elements of a callus which subsequently would be converted into new bone. The grafts were obtained by removing from the tibia thin layers of bone with attached periosteum, and were placed along the fragments and across the fracture site so that both surfaces of the graft came in contact with living tissues and no dead space remained. The extremities of the graft were in contact with the ends of the bone to be repaired and were held in place by means of catgut sutures through the muscles.

In 1931, Phemister[4] published a treatise in which he demonstrated that ununited fractures in which there is little or no displacement or angulation of the fragments may be treated satisfactorily by the simple application of whole thickness splint or onlay grafts to the fragment surfaces bridging the fracture line and held in place by the sutured soft parts. In 1937, Harkins and Phemister[2] reported on the use of this technic in 39 cases of operation with only one failure. In each instance, the bone of the fracture site was laid bare on one side only leaving the attachments on the other side to help maintain position. Cancellous and whole thickness onlay grafts were applied and held in place by suturing soft parts about them. The grafts were intended to set up osteogenesis and serve as supplementary bone but not immediately to fix the fragments to any appreciable extent. The success of the procedure was attributed to the fact that if a large onlay graft is applied across the fracture line in good contact, union takes place between it and the fragment ends and then the intermediary callus ossifies whether it is old or new.

Fig. 12

Case 5.—L. P. Anteroposterior and lateral views of left femur 28 months following operation.

Again in 1947, Phemister[5] reported on the "treatment of ununited fractures by onlay bone grafts without screw or tie fixation and without breaking down of fibrous union."

The steps of the operation were reviewed. The bone was exposed and the periosteum was reflected only from the site to which transplanted bone was to be applied. The remaining periosteum and callus maintained the position of the fragment ends. Any protruding bone was chiseled off the denuded surface in order to create a satisfactory bed for the graft or grafts. Usually the fibrous intermediary callus was left in place, since it was found later to ossify along with the bony union between the fragments and the graft. The fracture site was then bridged by a strong, broad, whole-thickness onlay graft or by two somewhat narrower, whole-thickness onlay grafts. Cancellous bone was usually applied to the exposed fracture line on both sides of the graft. The periosteum and soft parts were then reflected and tightly sutured over the transplanted bone. The length of the graft was determined by the nature of the fracture and the length of the bone involved. For fractures of the mid-shaft of the long bones, grafts from 7.5 to 12.5 centimeters long were used; while those for the end of the shaft were from 5.0 to 7.5 centimeters long, since short grafts were said to fit better there and were easily held in place by the sutured soft parts.

Harkins and Phemister[2] (1937) analyzed the results in a series of thirty-nine patients operated upon by the simple onlay method. These cases comprised 42 per cent of the ununited fractures of the shaft operated upon during an eight-year period. Satisfactory results with bony union were obtained in 38 cases. Since then, Phemister[5] (1947) had further experience with 49 cases.

Bony union was reported obtained in 46 of the 49 cases.

In October 1945, Horwitz and Lambert[6] reported on a method combining bone grafting and internal fixation, a combined bone graft-metallic plate technic. They took their grafts from the ilium rather than the tibia, and the internal fixation was obtained by means of a metal plate. A considerable portion of the wing of the ilium was removed since massive grafts were desired. In accordance with Clay Ray Murray's emphasis on the necessity for fixation elements to be placed at right angles to each other in order to obtain maximum stability in fracture fixation, the grafts, fixed with two screws, were placed at right angles to the plate. The steps in their procedure involve reduction of the fracture ends, the application of a six-hole plate in the case of a femur, the cutting of a slot in the side of the shaft across the fracture site, the removing of the cortex in this section, opening up of the medullary cavity at both ends, the filling of the slot with two or three sliver grafts of ilium, the placing of the large graft over the inlay after thoroughly drilling its contact surface, and finally, fixation of the onlay graft with two screws. In 1947, the above authors[7] presented a later report on this use of massive iliac bone grafts combined with metal plate fixation in the treatment of ununited fractures and large defects of bone: of 34 cases in which this technic was employed, union following the initial graft occurred in 28.

In 1945, at the U. S. Naval Hospital in Dublin, Georgia, one of us (MBR) in operating upon a malunion of the femur with approximately two inches of over-riding, after the usual procedure of gaining end-to-end apposition, employed two nested T and G slotted bone plates for metallic fixation, and dual onlay full thickness tibial cortical grafts fixed across the fracture site by two wire loops rather than by screws. Bony fusion of the fracture site and of the grafts to the fracture area was obtained in three months as demonstrated clinically and by radiographs. Thereafter the wire loops were discarded and the technic of free lying iliac grafts was employed. The authors are not sure, since reports in the literature have not been followed for a sufficient period of years to their knowledge, whether or not the radical removal of large segments of the ilium, sometimes the whole wing, will not eventually alter the mechanics of the lumbar spine and the lumbo-sacral joint. They have observed as well that the successful take of smaller grafts obtained from the outer cortex only of the ilium in this present series seems to demonstrate that with adequate metallic fixation of the fracture fragments, the use of massive iliac grafts is not imperative under conditions given in these cases.

The number of cases reported here is of modest proportions. Although they were carefully screened and separated from a larger series which included delayed unions, delayed open reductions and cases of nonunion which were treated by methods other than herein described, nevertheless as such they represent consecutive cases. The criteria used to classify the cases presented, as instances of nonunion, include the rather classical types: pseudarthroses; fibrous union with osteoporosis of the fragments; fibrous union with sclerosis of bone; and finally several cases treated conservatively for months which, on open reduction, showed soft tissue interposition. Reference to *Table 1* will show that 27 such cases of nonunion were operated upon and the above described technic employed. There were two failures or 7.4 per cent. The average healing time was 3.8 months. The standards for the determination of healing time were clinical rigidity and adequate connecting callus visualized in the radiographs. The complications were few. As noted in the table, the plate for various reasons was removed in 6 instances. One was broken and one became loose. In two cases, although the incisions healed by first intention, the skin over the plate later broke down subsequent to brace wearing; which attests to poor placement of the plates. Two plates were removed because of subsequent low grade infection. Both of these cases were originally compound fractures. The average follow-up time was almost two years, 1.9 months. In most cases, rather notorious nonunions be-

RESULTS

	No. Cases	Age	Healing Time (Months)	Follow-up Time (Years)	Plate Removed	Failures
Femur	6	25.8	3.6	1.8	1 (broken)	1
Humerus	5	32.4	3.9	2.0	1 (loose)	1
Both bones, leg	8	23.8	5.2	2.0	3 (skin defects 2 osteo 1)	0
Bones, forearm	8	29.0	2.8	1.8	1 (osteo)	0
Average and totals	27	27.75	3.8	1.9	6	2

Failures 7.4 per cent.

Table 1

cause of previous repeated surgical attempts at repair, the affected part was protected by a brace for many months even though the healing was to all intents and purposes quite solid. This applied to fractures of the humerus and both bones of the forearm as well as to fractures of the femur and both bones of the leg. In the one instance of failure to heal in a nonunion of the humerus (cited in *Table 1*), clinical and radiographic union was evident at the end of 6 weeks. Because there were additional unhealed fractures in the forearm of the same extremity, and in order to mobilize the elbow joint, the long arm plaster was removed at the end of 7 weeks and a forearm cast applied against such time as the remaining fractures could be openly reduced. Apparently the leverage of the forearm plaster induced such strain on the humeral fracture site that the callus showed progressive absorption over a period of many weeks and in spite of belated further casting, nonunion ultimately recurred.

SUMMARY

A simple surgical technic for the treatment of nonunion is presented. The method includes the use of a slotted metal plate for fixation of the fracture fragments, and multiple free lying iliac bone grafts for osteogenesis. The bone grafts are taken from the outer cortex only of the ilium, are not necessarily massive, and are laid along the host bone and across the fracture site without any means of internal fixation. Two failures occurred in a series of 27 cases.

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DISCUSSION (*Abstract*)

Dr. Hugh M. A. Smith, Jr., Memphis, Tenn.—Disregarding the minor details of technic that are common to most procedures for delayed union and nonunion, I wish to emphasize two important principles of therapy: first, for want of a better term, "trombone" fixation, namely, fixation that prevents malposition, but still permits compression forces to exert a favorable influence upon healing of the fracture. Eggers and others have made an important contribution to the treatment of fractures by emphasizing this factor. The second principle is the use of an active osteogenic element. Preserved bone and homogenous and heterogenous grafts are poor substitutes for fresh, viable, autogenous, cancellous bone.

These two principles, which I heartily endorse, are incorporated by Drs. Roche, Jostes, and Neumann into a sound, effective, and simple technic. Other technics are, at times, preferable. This statement need not detract from my recommendation of their method, since they make no claims for its applicability to all fractures with delayed or nonunion. For example, intramedullary fixation and iliac grafts for nonunion of the femur utilize the same principles but with the added advantages of early ambulation and mobilization. I would prefer the Phemister technic for this occasion: a fracture of the middle and lower third of the tibia in good position and alignment with incomplete union, continued pain, but with little or no motion clinically.

Further, the technics employing rigid fixation cannot be discarded. The single and dual onlay graft still play a major role in some of the more difficult nonunions and defects. Their reliability is proven.

I do not believe that the number of cases reported is large enough to be conclusive, and I particularly refer to indications. They are encouraging enough, however, to alter my ideas of metallic fixation in lieu of cortical grafts. My experience with this technic has been limited to fresh fractures, and the results have been gratifying. Other than for the femur, I am now willing to extend its use to many delayed unions and quite a few nonunions.

Dr. Rufus Alldredge, New Orleans, La.—We have been using a method somewhat similar to Dr. Roche's for the past four years.

In 1946 we abandoned the full thickness cortical massive onlay grafts and sliding grafts almost completely.

We, too, have substituted metal internal fixation in some of these cases, with the simple use of cancellous bone chips packed around the fracture site or in between the bone ends where there was loss of part of the shaft. We go through the outer cortex of the ilium and get cancellous bone chips. The smaller the chips are, the better.

The treatment of each bone has to be individualized. In the femur where no portion of the shaft has been lost, simple use of a nail, such as Dr. Smith showed, with bone chips from the ilium packed around the site of nonunion is all that we have found necessary for prompt and excellent union in all the cases that we have had thus far.

In fractures of the femur, where there is loss of a portion of the shaft, we have used a nail, packed the intervening space where the shaft was lost for a distance of 2½ inches in one case with cancellous bone, and used no full thickness cortical grafts or any other type of graft. We have obtained complete replacement of the shaft with excellent results in as short a length of time as one could get union of a fresh fracture of the femur.

This makes me think that the proper use of metallic internal fixation together with simple cancellous bone chips eliminates to a great extent the need for the well known and positively beneficial effects of compression of fracture fragments.

I am sure that it, to a great extent, eliminates the need for that favorable force. In simple fractures of the tibia where there is no loss of substance and where the fibula is holding and the fracture is stable, we have not used any internal fixation. We have simply exposed the fracture and packed cancellous bone chips, the smaller the better, well around the fracture site. We have obtained satisfactory results in the small number of cases treated in the past four years.

In fractures of the tibia, most of which have been compounded, where three or four inches of the shaft have been lost, we have not known a good method of internal fixation with replacement of bone.

In that type of case, we have first transplanted the upper end of the fibula into the tibia at the first stage, and next we have transplanted the distal end of the fibula into the tibia. Then we have gone directly into the shaft where the missing segment is and packed that full of small cancellous bone chips. We have had complete replacement of the shaft of the tibia in that way.

Both ends of the tibia were solid before the gap was filled with bone chips, and I am sure that we had not the advantage of the compression forces that we have recognized as important.

In fractures of the humerus and the forearm bones, the simpler the method the better. Usually a single bone plate with addition of cancellous bone chips is all that is necessary.

I, too, feel that this method has the other great advantage already referred to in most patients. By using it we avoid mutilating the tibia, avoid the dangers of fracture following removal of a graft from the tibia and also the necessity for the use of a bone bank.

There is hardly a case in which one may not take bone from the ilium without hurting the patient. It does not keep him down longer than if one fails to operate upon the ilium.

We have used this method for four years, and we find that we have little if any need for a bone bank.

Dr. Roche (closing).—As to how wide a range of cases of nonunion the technic is applicable to, allow me to state that we have not employed it in instances of large defects in bones because we have not been employing massive bone grafts. Again, this method would probably not be satisfactory for a nonunion which has an appreciable interval defect between the fragment ends. We have used it in all the instances, examples of which you have seen, in which the bone ends could be accurately approximated and tailored to fit each other.

SURGICAL CORRECTIONS OF VERTICAL HETEROTROPIAS*

By CHARLES T. MORAN, M.D.†
Louisville, Kentucky

The surgical correction of vertical heterotropias has been in the past, a field of muscle surgery which ophthalmologists approached with a great deal of indecision. Because of the complex actions of the vertical muscles these heterotropias present a much more difficult problem than horizontal deviations, and the results of improper operative procedures can be extremely disturbing to the patient and embarrassing to the surgeon. In vertical deviations, you have not a pair of glasses to correct a small residual esotropia, nor does the fusion faculty aid to any great extent as it does in horizontal deviations. In recent years many of the objections to operative procedures on vertical muscles have been overcome by special attention directed to the basic physiology of the ocular muscles and application of the facts thus ascertained to the surgical correction of vertical anomalies.

Nowhere in ocular muscle surgery is the individual consideration of each patient so important. Repeated examinations and measurements with each eye fixing separately, and the study of versions with each eye fixing, are necessary before the surgeon can gain the proper information that will enable him to determine which muscle or muscles are to be attacked and on which eye.

There are several points that must be considered in vertical muscle surgery. The well known relationship between the superior rectus and the levator may produce a widening or narrowing of the palpebral fissure after recession or resection of the superior rectus. Also, surgery on the inferior rectus may produce a diplopia in the lower fields which is much more disabling to the patient than a diplopia in the upper fields. Therefore, if possible, it is preferable to do most of the corrective surgery on elevators. But there are some situations in which it is necessary to advance or recess a depressor. There is also the

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combination of vertical and horizontal deviations where the question arises as to which should be corrected first. It has been said by many competent ophthalmologists that the vertical deviations are often the cause of the horizontal ones and that they should be corrected first and if this is done the horizontal deviations will disappear in many cases. I do not recall having had that experience. However, if the vertical deviation is very large in comparison to the horizontal and the more prominent feature of the case, correction of the vertical defect first is justified.[1] In many cases when the horizontal deviation is corrected the vertical defect becomes less; especially is this seen in overactions of the inferior oblique in a convergent strabismus. In those cases where overaction of the inferior oblique is not reduced after a recession of the medial rectus the overaction may be the result of a paretic superior rectus. In most cases it is preferable to correct the horizontal defect first and if there is still a hypertropia present that interferes with the establishment of fusion, the surgeon is in a much better position to study the hypertropia and determine which muscle is the offender.

The most important factor to consider in the surgical correction of all vertical heterotropias is determination of the habitually fixing eye, because the fixing eye controls the innervations arising from the central nervous system and distributed to each eye in equal amounts (Hering's law). The law of reciprocal innervations (Sherrington's law) also plays an important part, and because of these two laws we have an explanation of the fact that in paralytic heterotropias the secondary deviation is always greater than the primary deviation. These facts explain why determination of the fixing eye is the keystone upon which plans of reconstruction are based.

A practical application of primary and secondary deviations can be illustrated in a case of paresis of the right superior rectus (*Fig. 1*). When the patient fixates with his left (nonparetic) eye, a normal innervational impulse goes to the left eye. This same impulse goes also to the right (paretic) eye in accordance with Hering's law. Because of its paresis the right superior rectus cannot respond normally to this impulse and there will be present a right hypotropia. This is primary deviation. On the other, if the patient fixates with his right (paretic) eye, it is necessary for the brain to send an increased innervational impulse to the paretic right superior rectus in order for it to accomplish fixation. Again, according to Hering's law, this same increased impulse goes to the right superior rectus, the left inferior oblique causing it to overact and to produce a left hypertropia. This is secondary deviation. Secondary deviation is always greater than primary deviation.

The deviation that should be corrected is the one present when the measurements are made with the patient fixing with his dominant eye or his habitually fixing eye.[2] After a decision that the right superior rectus is paretic and the patient fixes with the right eye has been made, the problem is to decide what muscle or muscles are to be operated upon. It is difficult to decide how paretic the superior rectus is, as the secondary deviation may be measured many times with variable findings, so it has been my practice to recess the inferior oblique of the nonfixating eye first, and then after all the reaction has subsided and the tissues have healed, make a re-evaluation. If there is a large amount of residual left hypertropia, a shortening of the paretic muscle or perhaps a slight weakening of its antagonist inferior rectus must be done. It is usually desirable to resect the superior rectus 3-4 mm. and advance it 2 mm. It may be dangerous to resect more than 4 mm. as the superior oblique crosses under the superior rectus about 2 mm. from the medial end of its insertion. A 2 mm. recession of the

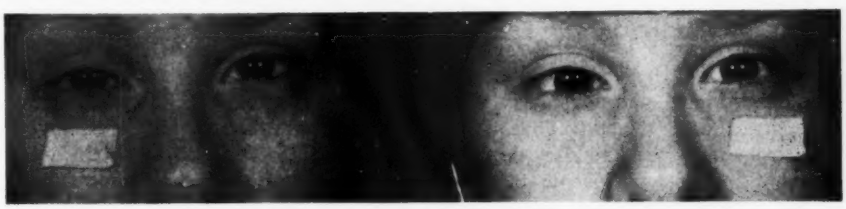

Fig. 1

(Left) Paresis of the right superior rectus. The patient is fixating with the right (paretic) eye, illustrating a left hypertropia or the secondary deviation.

(Right) The patient is fixating with the left (nonparetic) eye illustrating the right hypophoria or the primary deviation.

inferior rectus may be done at the same time. This amount of recession has not in my experience affected adversely the lower field of gaze. I believe a small recession of the antagonist is necessary to a permanent result, as this reduces the depressing action against a freshly resected paretic muscle and gives the weak muscle an opportunity to function more freely than it would if it had to overcome a normal amount of antagonistic action. The idea of operating in stages has been termed the orthopedic method and is to be recommended not only in vertical but horizontal muscle surgery. If the primary deviation is to be corrected, both the superior and inferior rectus should be done at the same time. It may not be necessary to operate upon the left inferior oblique at all.

The above principles of correcting the primary or secondary deviation, depending upon the fixating eye, can be applied to all vertical heterotropias. In a paresis of the superior oblique there is always present an overaction of its antagonist, the inferior oblique. This is especially marked when the patient fixes with the paretic eye; this overaction is also present when the fixating eye is the nonparetic one, but is not so pronounced.[3] If the patient fixes with the nonparetic one in a paresis of the right superior oblique, the primary deviation will be the right hypertropia. Therefore we should direct our surgical procedures to correct this defect by strengthening the paretic superior oblique, at the same time weakening its antagonist, the right inferior oblique. If, however, the patient habitually fixates with the paretic eye, not only must one operate upon the right superior and inferior oblique, but the secondary deviation must be corrected by a recession of the left inferior rectus. In this situation it is better to operate upon the paretic eye first, and then at a later date if the defect in the lower field is still present, a recession of the opposite inferior rectus can be done.

In a case of paresis of the right inferior rectus, fixating with the nonparetic left eye, the primary deviation would be right hypertropia. Resection of the paretic muscle and a small recession of its antagonist superior rectus should be done. If the paretic right eye fixates, the secondary deviation would be the left hypotropia due to the overaction of the yoke muscle of the paretic right inferior rectus, the left superior oblique. After the resection of the paretic muscle and recession of its antagonist have been done, if there still remains an overaction of the left superior oblique, a tenotomy of this muscle should be considered.

Surgery of the superior oblique muscle, at the present time, is in a transitory phase. In the past, surgical correction of a paretic superior oblique was directed first to its direct antagonist, the ipsolateral inferior oblique, which was weakened by a tenotomy or a myectomy; second to the yoke muscle, the inferior rectus of the opposite eye, which was weakened by a recession; and third to the superior rectus of the paretic eye which was weakened by a recession. Most surgeons preferred the first combination, but none advised a direct attack on the paretic muscle. It was not until 1935, when Dr. Wheeler[4] published his description of advancement of the tendon of the superior oblique for a paresis of that muscle, that any surgical attack was recommended upon the superior oblique. Even then most surgeons felt that the operation was a difficult and dangerous procedure.

When Dr. Walter Fink[5] presented his work on the anatomy of the superior and inferior obliques, more enthusiasm for operative procedures on these muscles became evident. This study played an important role in clarifying some of the doubts pertaining to the difficulties of operative procedures on the obliques. Dr. Fink stressed the close relationship of the superior oblique with the superior rectus and pointed out the many variations in the insertions and the close relationship of the insertions to the optic nerve and vortex veins. He also described an improved method for recession of the inferior oblique at its insertion and the method of tucking the superior oblique.

In 1946, Dr. R. N. Burke[6] published his description of the technic for a tenotomy or tenectomy of the superior oblique. This procedure is not difficult to perform.

In 1946, Dr. William McGuire[7] published his paper on resection of the superior oblique with removal of the superior rectus. This method greatly facilitates the exposure of the superior oblique tendon and makes any procedure, whether a tucking or a resection, easier. Dr. Fink prefers not to remove the superior rectus, but it requires a great deal of traction to obtain adequate exposure to carry out these procedures. In my experience the trauma to the superior rectus is more severe after prolonged traction than if the tendon of the superior rectus is neatly severed and the muscle reflected.

SUMMARY

Increased attention to the basic physiologic principles governing action of the muscles and careful determination of the fixating eye in cases of vertical heterotropia will aid greatly in deciding which muscles should be operated upon.

Recent improvement in knowledge of the anatomy of the oblique muscles and modern technics of operating make feasible and practicable a direct surgical attack upon these muscles.

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THE SURGICAL SIGNIFICANCE OF THE CARDIOSPLANCHNIC REFLEX*

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Revived interest in interruption of the sympathetic nervous system has brought the surgeon and internist into close collaboration in the diagnosis and treatment of many conditions. A variety of organic and functional vascular changes, as well as sympathetic dystrophies and pathologic reflexes, are encountered by one seeing these cases. Severe abdominal pain in cardiac lesions is not a rare occurrence. One of us reported an incidence of abdominal symptoms in 21 per cent of acute heart conditions. About half of these patients had abdominal symptoms only.[1] Less frequently recognized, however, is the precordial pain occasionally seen in upper abdominal lesions.[2 3 4] This anomalous cardiosplanchnic reflex deserves comment. It represents a differential diagnostic problem which may be readily solved by a selective procaine sympathetic nerve block. Pain in the thoracic or abdominal wall is seldom of visceral origin, but is somatic, and may be recognized by eliciting skin tenderness or by blocking the corresponding spinal nerve.[5]

Much of our knowledge of the anatomy and physiology of the sympathetic nervous system has been established not by laboratory dissection, but rather by the clinical observations following procaine block[6] or surgical section of specific segments.[7]

It is well known that cardiac pain passes through sympathetic pathways via afferent fibers of the superior, middle, and inferior cardiac nerves and these enter the corresponding cervical ganglion before terminating in the gray matter of the spinal cord to ascend for the main part in the dorsolateral fasciculus or tract of Lissauer. Thus a chemical block or surgical excision of the left inferior cervical or stellate ganglion will relieve or abolish left sided anginal pain in most cases.[8 9] Kuntz and Morehouse[10] have shown that there are medullated nerves joining the second, third and fourth sympathetic ganglia to the cardiac plexus directly, and because of this it is occasionally necessary to extend the interruption of the sympathetic pathways to the fourth thoracic ganglion.

Pain impulses from the abdominal viscera are carried by the splanchnic nerves[11 12] which are generally found in three divisions, namely: the greater, lesser and least. The first two may be fused, particularly below the diaphragm. The greater splanchnic usually arises only from as high as the sixth dorsal but in some individuals may arise from the spinal cord as high as the fourth or fifth thoracic segment.[13] This is significant in the formation of the cardiosplanchnic reflex.

Fig. 1 illustrates the important components of the mechanism of the cardiosplanchnic reflex. Since the cells of origin for the stellate ganglion can be in the upper four or five segments of the cord, pain impulses from two unrelated systems, such as the heart and abdominal contents, can strike the spinal cord in the same gray sensory area in two complete and identical segments, namely: the fourth and fifth thoracic. It is the occurrence of this anatomical configuration which permits abdominal pain in cardiac lesions and cardiac pain in abdominal lesions.

The following case reports illustrate the clinical diagnostic problem encountered when this

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reflex is active. *Cases 1* and *2* have been previously reported but are presented again with *Case 3* to point out vividly mistakes in diagnosis derived by means of the standard diagnostic aids. These may be contrasted with other cases presented in which the true offending system was identified by using a selective procaine sympathetic nerve block to neutralize the limb of this reflex which was actually at the source of the lesion.

Case 1.—A fifty-year-old white dairy farmer was admitted to the hospital complaining of acute pain in the mid-epigastrium, nausea and vomiting. The temperature, pulse, and blood pressure were normal. There was a soft systolic murmur at the apex which was not well transmitted. There was tenderness over the entire abdomen most pronounced just above the umbilicus with no definite rigidity but some guarding. The white blood count and the serum amylase were normal.

One hour after admission, he appeared somewhat better and the pain was localizing in the right upper quadrant. A provisional diagnosis of gallbladder colic was made. Four hours after admission, the pulse rate increased from 70 on admission to 98 and the blood pressure was 150/60. The pain remained in the right upper quadrant, but his general condition was much improved and he was given sedation and oral fluids.

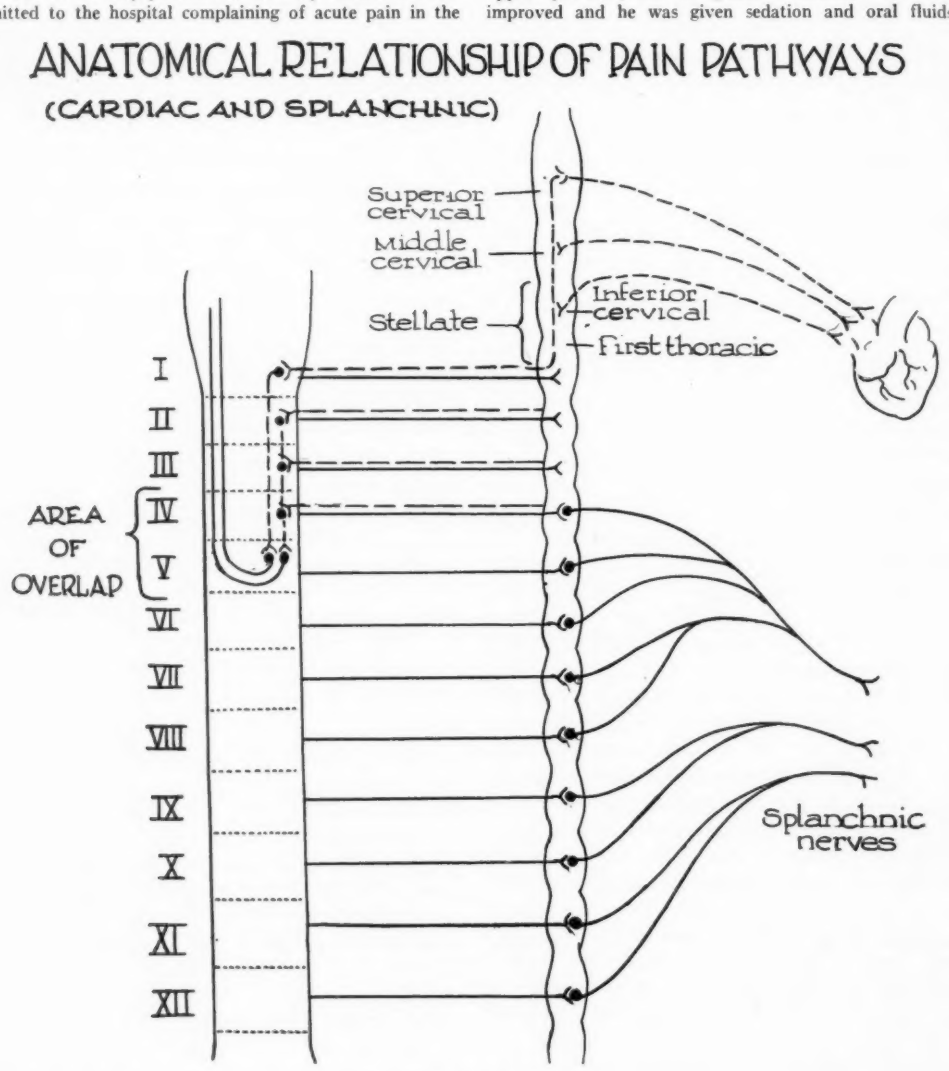

Fig. 1

Anatomical mechanism of the cardiosplanchnic reflex. Note the overlapping of sensory impulses at segments four and five arising from the heart and abdomen.

Shortly after this he complained of a tightness in his chest, suddenly became cyanotic and pulseless and expired.

Postmortem examination revealed a ruptured aneurysm of the ascending aorta, hemopericardium with cardiac tamponade. Examination of the abdomen revealed no pathological condition.

The history, physical examination and usual laboratory findings presented no evidence by which any early diagnosis could have been made in this case. A differential nerve block was not considered.

Case 2.—A thirty-four-year-old man was admitted complaining of agonizing pain in the epigastrium. Twenty-four hours earlier he developed a mild pain in the left shoulder and two hours before admission was seized with severe abdominal pain, accompanied by nausea and vomiting. He was known to have a peptic ulcer with several previous exacerbations.

His temperature was 99, pulse 90 and blood pressure 80/40. Respirations were increased, and the chest was clear. The heart sounds were of good quality and the rhythm and rate were normal. There was a generalized abdominal rigidity and marked tenderness in the epigastrium.

The white blood count was 22,500 and the urine was negative. An electrocardiogram revealed evidence of some myocardial damage to the posterior wall; x-ray of the abdomen for free air was negative.

After admission the temperature and white blood count continued to rise, his abdomen remained spastic and his blood pressure and pulse remained unchanged. After medical and surgical consultations, a diagnosis of perforated peptic ulcer was agreed upon. A laparotomy was performed but no abnormality was found. On the first postoperative day, the patient's condition remained the same, but on the second day, he suddenly had marked dyspnea, became cyanotic and expired.

Postmortem examination revealed a thrombosis of the right coronary artery, rupture of the posterior wall of the left ventricle, hemopericardium and an inactive duodenal peptic ulcer.

In this case, a differential procaine block might have established the diagnosis, as there was some evidence of coronary involvement. However, clinical and laboratory findings suggested an abdominal catastrophe and upon this basis a laparotomy was considered necessary.

Case 3.—A sixty-four-year-old white man with a known 3-year history of peptic ulcer was admitted to the hospital with gastric hemorrhage and pyloric obstruction. He was given the necessary transfusions, his hemorrhage ceased, and he was prepared for surgery. During the second hospital day he developed excruciating pain in the epigastrium, with slightly elevated pulse, but no thoracic pain. On the fifth day a subtotal gastrectomy was performed. Immediately upon leaving the operating room his head, neck and shoulders became cyanotic, he went into peripheral circulatory failure and expired.

Autopsy revealed a recent extensive myocardial infarction of the anterior left ventricular wall and interventricular septum (approximately 3 days old).

The absence of precordial pain resulted in failure to diagnose the acute infarction. The exacerbation of upper abdominal pain while he was being prepared for surgery was attributed to his known peptic ulcer and the previously scheduled surgery was undertaken with fatal results.

Case 4.—A fifty-six-year-old man was admitted with an acute attack of upper abdominal pain. He was in shock, with rapid pulse and cold clammy pale skin. The abdomen was not distended or rigid. There was slight tenderness and decreased peristalsis. X-ray examinations revealed no free air in the peritoneal cavity, distended bowels or fluid levels of intestinal obstruction. Since the degree of shock was out of proportion to the abdominal findings a coronary occlusion was considered. A splanchnic block was carried out with 20 cc. of 1 per cent procaine without relief of his symptoms. A left stellate block was then performed using 10 cc. of 1 per cent procaine and the pain was immediately decreased. About two hours later a right stellate block was done and symptoms were again further relieved. After a precarious course he finally recovered. Electrocardiograms in this case were typical of an extensive myocardial infarction.

The atypical abdominal pain in this patient with myocardial infarction resulted in his being admitted to the surgical service with a diagnosis of acute abdomen. The relief by stellate block established the thoracic origin of his symptoms and prevented a laparotomy which might have been a fatal mistake.

Case 5.—A fifty-seven-year-old plasterer was admitted complaining of sudden abdominal pain and weakness. His illness began three hours prior to admission and was not accompanied by vomiting or bowel changes. He had had a similar, but less severe, attack fifteen months previously. The pain was continuous and did not radiate from the upper abdomen.

Examination revealed a thin male who was apprehensive and in a cold sweat. The temperature was 98.8,° the pulse 80 with irregular variations in amplitude. The blood pressure was 100/70. The heart was not enlarged and there was an apical systolic murmur.

Abdominal findings were tenderness in the epigastrium and left upper quadrant with generalized rigidity. There was no distention, and bowel sounds were hyperactive.

X-ray examination of the abdomen was negative. An electrocardiogram revealed a heart rate of 100 with inverted T waves in several leads. Interpretation of the tracing presented border-line evidence of a myocardial infarction which could not definitely be ruled out without further studies.

A differential diagnosis between coronary thrombosis and an acute abdomen was necessary and further studies were undertaken. A right splanchnic block with 1 per

cent procaine was performed. The abdominal rigidity markedly lessened and the patient had prompt relief of his pain. On the basis of this test, treatment of an acute abdominal emergency was instituted, including gastric intubation and suction, intravenous fluids and antibiotics. Subsequently reported laboratory data revealed a leukocyte count of 19,000, normal serum amylase and other blood chemical tests.

The patient improved and additional x-ray studies of his abdomen twenty-four hours later demonstrated free air in the peritoneal cavity. Since he improved on conservative treatment, this was continued and normal recovery followed.

In this confused clinical picture, electrocardiographic evidence was in favor of a coronary thrombosis. However, this was ruled out by procaine splanchnic nerve block and the condition was later proven by x-ray examination and subsequent clinical course to have been an abdominal rather than thoracic lesion.

Case 6.—A forty-six-year-old white woman was admitted for one month in June, 1948, for coronary thrombosis verified by electrocardiogram which was later found in error due to inadvertently reversed leads. However, repeated electrocardiograms showed variations in the S-T segment. The precordial pains recurred at frequent intervals for two years and were excruciating. She was denied the privilege of working and was given frequent narcotics for relief of her pain. A gastrointestinal x-ray series was reported to be normal. Recently a cholecystogram revealed two small radiolucent stones.

During the present admission an attack of precordial pain was treated by stellate block which was without benefit. A right splanchnic block was then performed with immediate relief of her substernal pain. This was repeated during another attack with similar dramatic results. A cholecystectomy was performed and two small stones were found, one tightly occluding the cystic duct. She has had no subsequent attacks.

This patient developed marked personality change, mental deterioration and economic deprivation because of the frequent severe pains and enforced inactivity, due to an incorrect diagnosis which was finally established by simple differential nerve blocks. The diagnosis was proven and symptoms relieved by cholecystectomy.

Case 7.— A forty-three-year-old physician was admitted to the hospital March 22, 1949, with excruciating precordial pain, requiring 400 mg. of demerol® for relief of pain. He was immediately dyspneic, but was not in shock. His pulse was rapid but his blood pressure and blood count were normal. Several electrocardiographic tracings revealed various changes in the S-T segment (*Fig. 2*) and a diagnosis of posterior myocardial infarction was made. He was hospitalized for 3 weeks, finally returning to limited activity, continuing to have less severe but similar attacks of cardiac pain. His pains

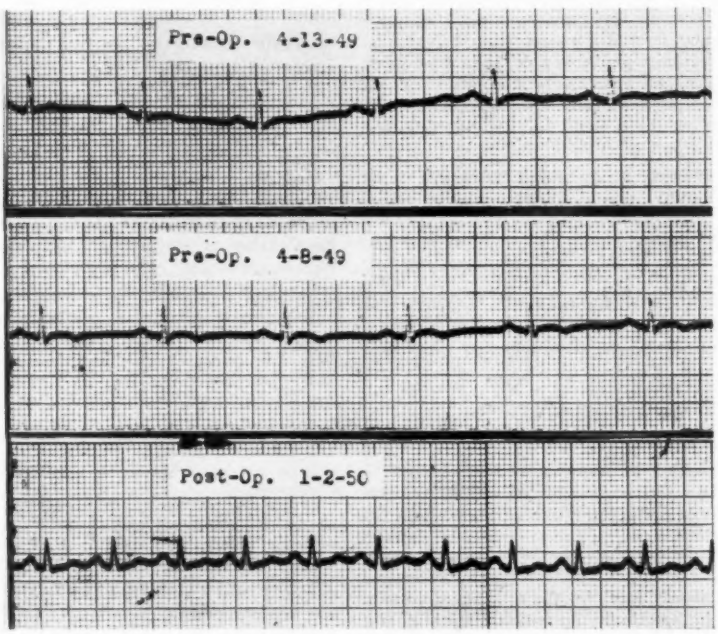

Fig. 2
Second leads of electrocardiographic tracings in *Case 7*. Preoperative tracings reveal isoelectric and inverted T waves.

became more severe and more frequent, requiring large doses of narcotics for relief.

At the time of a severe attack a left stellate block was carried out using 10 cc. 1 per cent procaine. A successful block was indicated by a Horner's syndrome, but there was no definite relief of pain. The abdominal origin of his pain was thus suspected and a right splanchnic block with 20 cc. 1 per cent procaine resulted in immediate and dramatic relief.

In spite of a negative gastro-intestinal x-ray series and a negative cholecystogram, laparotomy was performed and a stone was found impacted in the cystic duct. The gallbladder was removed.

He has had no recurrence of symptoms during the fifteen months since his operation. Postoperative electrocardiograms (*Fig. 2*) do not show previous abnormality.

This doctor was unjustly regarded as a cardiac patient and suffered considerable economic loss and unnecessary suffering until the true cause of his precordial pain was determined by differential stellate and splanchnic block and proven by cholecystectomy.

SPLANCHNIC BLOCK

The technic of a splanchnic block is not difficult. The placement of the needle is essentially the same as that of a lumbar sympathetic block, but somewhat higher and deeper. *Fig. 3* represents a cross section at the site of the needle in a splanchnic block, in which the injected anesthetic solution is permitted to diffuse in an area anterolateral to the body of the first lumbar vertebra

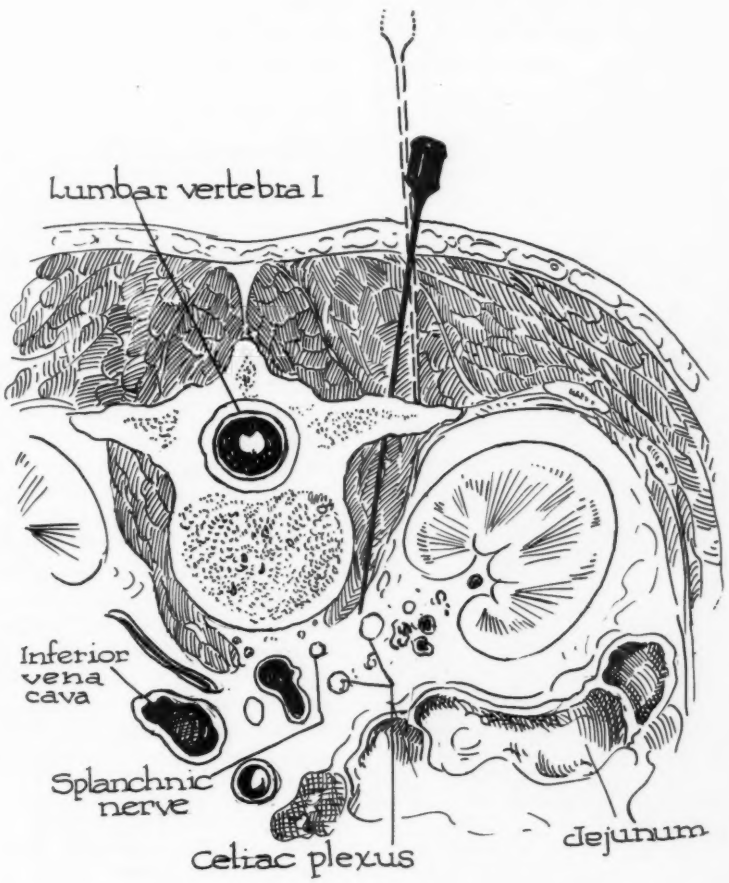

Fig. 3

Cross section through L1 illustrating the position of needle in a splanchnic block. A 4- to 6-inch 20 gauge needle is passed through a skin wheal 5 or 6 cm. lateral to the first lumbar spinous process. It is then partially withdrawn and redirected above the process and more medially and inserted 4 or 5 cm. deeper, into the region of the splanchnic nerves and celiac plexus.

where the greater and lesser splanchnic nerves are closely associated as they emerge from the diaphragm and enter the celiac plexus.

With the patient in the prone position a 4 or 6 inch 20-gauge needle is inserted approximately 2 inches lateral to the upper border of the spinous process of the first lumbar vertebra. Upon encountering the transverse process the needle is partially withdrawn and deflected above the process and directed slightly medially as it is passed to an additional depth of approximately two and one-half finger breadths. About 20 cc. of 1 per cent procaine solution is injected following the usual precaution of preliminary aspiration. Postoperative x-rays have shown silver clips placed on the celiac ganglion and severed splanchnic nerves to be in this position.[14] This technic is simple and relatively safe. It is a valuable diagnostic and therapeutic block in severely painful upper abdominal lesions of visceral origin and will effectively eliminate cardiac pain of abdominal origin by interruption of the splanchnic limb of the cardiosplanchnic reflex.

In addition to the diagnostic significance of interruption of the splanchnic impulses, it has other applications. The pain of calcareous pancreatitis is relieved temporarily by splanchnic block and permanently by surgical section.[15] We have also used this procedure to alleviate pain of posterior penetrating peptic ulcer, severe colic induced by a stone in the bile ducts and on many occasions to relieve pain caused by renal calculi and to facilitate passage of the stone. This latter condition will be discussed in a future report.

Fig. 4
Note the positioning and beginning pressure displacement of soft tissues overlying the stellate ganglion.

STELLATE BLOCK

A stellate block consists of the interruption of sympathetic nerve impulses passing through the cervicodorsal chain and ganglia by infiltration of an anesthetic solution into the region of the stellate ganglion. This technic[16] should be familiar to every physician treating cardiovascular and peripheral vascular diseases. It may be carried out quickly and simply by the anterior tissue displacement method here presented.

While standing on the side to be injected (*Fig. 4*) the index and middle fingers, separated 1 or 2 cm., are placed along the medial border of the sternomastoid muscle with the lower finger just above and against the sternoclavicular articulation. The finger tips are then pressed slowly but firmly into the neck. The carotid pulsation is felt on the volar surface of the fingers as it is retracted laterally. The visceral bundle, consisting of the trachea, esophagus and the thyroid gland, is displaced medially and the dome of the lung, occasionally rising into the base of the neck, is displaced downward. The transverse processes and sides of the bodies of the lower cervical vertebrae are felt by the finger tips. With these structures displaced the ganglion lies subcutaneously on a bony surface between the finger tips where it may be safely infiltrated (*Fig. 5b*). The examinating hand is then removed, allowing the structures to fall back into position as the depressed skin slides along the needle shaft (*Fig. 5c*). Following the usual precaution of preliminary withdrawal on the plunger, 8 to 10 cc. of 1 per cent procaine solution is injected.

Stellate block has many uses. It is a most valuable procedure for the relief of painful thoracic visceral lesions[17] and in early cases of cerebral thrombosis and embolism.[18-21] It is important in the treatment of the postcoronary shoulder-hand syndrome,[22] in causalgia[23-26] and in sudden arterial occlusion of the upper ex-

tremity.[27 28] It may be repeated daily or more frequently without danger or discomfort to the patient. In our present discussion it is presented as the method of interrupting the cardiac limb of the cardiosplanchnic reflex in order to establish or rule out a real cardiac lesion as the cause of pain in either the chest or abdomen.

SUMMARY

The anomalous cardiosplanchnic reflex has been presented as one of the avenues for the transfer of thoracic and upper abdominal pain.

The use of a selective procaine sympathetic nerve block to neutralize the limb of this reflex which is actually at the source of the lesion is urged as an aid in the diagnosis of such problems.

Seven cases have been presented to illustrate the clinical difficulties encountered when the cardiosplanchnic reflex is active. In three of the cases, routine methods resulted in an error in diagnosis. In the other four, the correct site of the actual pathology was identified by the application of a selective procaine sympathetic nerve block.

Methods of stellate and splanchnic block have been presented which are technically not difficult to perform and should be in the armamentarium of the physician who sees acute diagnostic enigmas.

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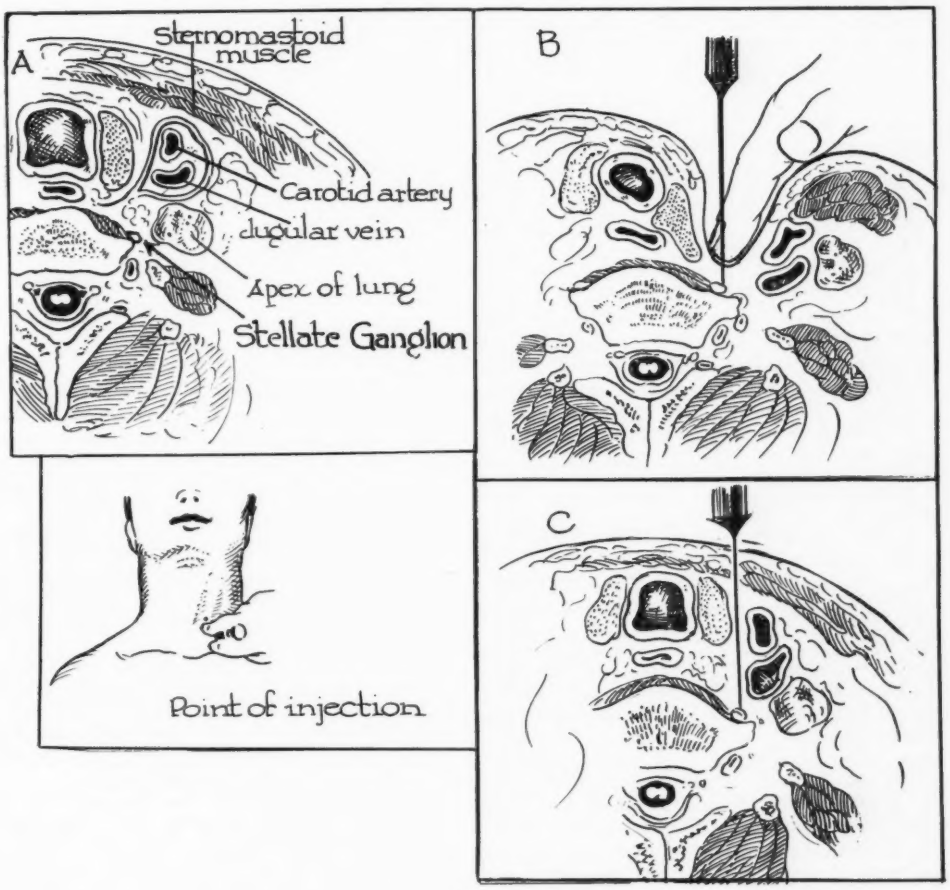

Fig. 5

(A) Cross section at the seventh cervical vertebra demonstrating the normal anatomical position of vital structures in the path of a stellate ganglion block. (B) Note the displacement of vital structures by palpating fingers. (C) Final positioning of needle to stellate ganglion.

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DISCUSSION (*Abstract*)

Dr. M. G. Flannery, Miami, Fla.—In the past several years the autonomic nervous system, and the possibilities its temporary or permanent interruption offer for diagnosis and treatment, are becoming more prominent in medical thinking.

This paper illustrates the importance of the knowledge of the innervation of the various organs, viscera and vascular systems. Stress is placed on the reflexes between the regions of the gallbladder and the heart.

As far back as 1909, Dr. Robert Babcock of Chicago cited cases of organic heart disease, especially angina pectoris, which were benefited by the removal of a diseased gallbladder.

In 1924, Hamburger and Strauss reported patients in whom disturbance of cardiac rhythm of long standing was corrected by the removal of stone-bearing gallbladders. In 1935, Wolferth and Fitz-Hugh reported on six patients with coronary patterns in their electrocardiograms, all of which returned to normal after removal of stone-bearing gallbladders. These important observations were apparently the first to be recorded in the literature.

In 1947, Dr. Howard Wakefield of Chicago reviewed this literature and reported several patients in which there was improvement in symptoms or a return to normal of the electrocardiograms after the correction of such visceral diseases as esophageal hiatus hernia, duodenal ulcer, gallstones, or nonfunctioning gallbladder.

Dr. Wakefield, working with Dr. S. W. McArthur as surgeon, and Dr. Grant Laing in 1946, working with me as surgeon, studied electrocardiographically the effect on the heart of the distended gallbladder in human beings.

Throughout the operation, which was for cholecystitis, the patient was connected with a portable electrocardiograph. Tracings were made beginning with the preparation of the skin, at the time when the third plane of anesthesia was reached, at the initial incision of the skin, on distention of the gallbladder with salt solution, and on release of the distention by again aspirating the salt solution.

Further study was made by attempting to block out the vagus with 1/75 grain atropine intravenously and again distending the gallbladder. The following changes were noted: (1) prompt increases in heart rate, (2) extrasystoles, (3) prolonged auriculoventricular conduction time and leveling of the T-wave to the iso-electric level in many instances, but complete inversion of T2 was not seen.

I think it behooves us all to increase our familiarity with the autonomic nervous system and the technic of its interruption, especially by procaine block.

The use of these technics to make a differential diagnosis is most important. Gilbert, Fenn and associates have demonstrated in the dog a decrease in coronary blood flow upon distention of the gallbladder.

White and his associates in an extensive necropsy survey showed that coronary disease occurred almost twice as often in patients with gallbladder disease as in those with normal biliary structures.

One might conclude from these findings that these visceral reflexes may serve as extrinsic cardiac factors in the eventual production of angina pectoris or possibly even coronary thrombosis.

The earlier one can determine that what appears clinically and electrocardiographically to be coronary heart disease is actually an abdominal lesion such as cholecystolithiasis, the better chance the patient has of being cured before there are irreversible changes in the heart.

It is especially important for those who see these patients in the home to utilize this knowledge of sympathetic nerve blocks, as it may offer in many instances greater relief of suffering, and valuable diagnostic help.

Dr. Walter C. Jones, Miami, Fla.—Dr. Smith and Dr. Larkin have given us diagnostic aids to prevent the

psychological damage which we may place on a lot of these patients by saying that they have coronaries. Two cases that have come under my observation in the last few years might have been benefited had we had such a diagnostic help as they have given us today.

A man, age fifty, had been under the care of a cardiologist in our city for many years and had been seen in 1943 and diagnosed as coronary with flattening of the T-wave. During the course of further study, definite changes in his gallbladder were found.

At operation in 1945, we found an enlarged gallbladder filled with stones and many adhesions. Since that date his cardiograms have been normal, he is very active and has returned to his normal occupation.

Another case was a woman, the sister of one of our urologists, who had been under treatment for a cardiac condition for many years. She had gone so far as to show not only the flattening of her T-wave, but some acute changes.

Her x-rays did not show any changes in her gallbladder during the functional study. The cardiologist recommended that we remove it, since her symptoms had shown that she had definite changes from dietary indiscretions, and especially gas and indigestion at night. She could get along well by avoiding fats and chocolates.

We removed the gallbladder and a pathological study showed it to be enlarged and elongated. Further study revealed a small stone embedded in the cystic duct. This woman now travels with her husband all over the country. She has no cardiac trouble at all.

Dr. Smith (closing).—Dr. Jones' cases represent the typical problem of differential diagnosis between cardiac and upper abdominal visceral lesions in which the pain manifestation is misleading.

This differential diagnosis can be made simple by adopting the method which we have presented. A stellate block successfully performed will usually relieve or alter pain of cardiac origin regardless of where it occurs but will not alter chest pain of abdominal or splanchnic origin. A splanchnic block, on the other hand, will promptly relieve severe pain of upper abdominal visceral origin even though it is manifest in the chest.

EVALUATION OF A RAPID METHOD OF CYTOLOGIC DIAGNOSIS IN SUSPECTED SKIN CANCER*

By JOSEPH M. HITCH, M.D.
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and
ANN SCOGGIN
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The popularization of cytologic diagnosis of cancer from cell smears stems from the exhaustive monograph by Papanicolaou and Traut[1] published in 1943. Although the reliability of the procedure in general was implemented by the differential staining technic of Papanicolaou, the principle involved has long been employed.

As early as 1867 Lucke and Klebs[2] described the identification of isolated tumor cells in ascitic and pleural fluids. Throughout the intervening years many workers have described various aspects of neoplastic and inflammatory cells in several of the body fluids, while the finding of cancer cells in vaginal smears was reported by Papanicolaou[3] himself in 1928.

However, the real expansion of cytodiagnosis of malignancy and refinement of technic have occurred within the past seven years. Originally the procedure was limited to detection of cancer in the female genital tract, but within a short time the method has been extended to many other body areas where secretions are available. Thus the current literature is replete with references to cytodiagnosis of cancer through examinations of urine, bronchial secretions, sputum, gastric washings, thoracic and abdominal fluids, duodenal and rectal secretions, sinus washings, nasopharyngeal secretions, prostatic fluid and esophageal secretions.

It is to be noted that in all of these situations the material dealt with consists largely of exfoliated individual cells and the examiner's interpretation is based on distinguishing the particular intimate characteristic structure of an abnormal cell from a normal one.

Whereas the Papanicolaou cytodiagnostic technic has been applied largely to exfoliated cells, the same circumstances usually do not exist in a cutaneous lesion which is suspected of being malignant. The method of obtaining smears in most cases presented here was with the use of a relatively small gauge hollow needle. Such a procedure, particularly when combined with aspiration, is by no means novel. An incomplete survey of the literature shows that such a method of obtaining tissue for pathologic study has been employed in connection with the breast, thyroid gland, prostate gland, lymph node, lung, various bones, testes, kidney and liver,[4] not to mention the more usual bone marrow and venous blood aspirations.

It was found that, by the method to be discussed, material could be obtained from most skin lesions in a form that lent itself to the staining procedures usually employed in cytodiagnosis. A survey of the literature failed to reveal any

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previous employment of a similar technic in the study of cutaneous malignancy. In 1947, however, Piaggio and Paseyro[5] demonstrated malignant cells by a modified Giemsa stain in smears made from serous fluid obtained by pressure on cutaneous metastasis of pulmonary carcinoma. Ellis[4a] in the same year published extensive evaluations of needle biopsy in many types of tumors, including several of the skin, but apparently these were processed in paraffin.

It is to be emphasized that this presentation in no sense advocates a needle puncture-smear technic in clinical dermatology as a substitute for the established and more accurate tissue biopsy. Practical application, if any, may be limited to cases where immediate confirmation of a suspected malignant lesion would permit indicated treatment without further delay or inconvenience.

METHOD

Since the primary interest in this study was the investigation of the reliability of diagnosis of cutaneous cancer from smears, several methods of obtaining specimens and various technics of staining were compared.

In some instances the cutaneous specimen removed by surgical biopsy was bisected and the cut surface rubbed on the glass slide (reminiscent of a "lymph node imprint"); in others the sides of the biopsy wound were scraped with a scalpel and the material thus obtained spread upon the slide. In ulcerative lesions occasionally material was obtained by simply scraping the denuded surface. However, in the majority of instances the lesion was punctured with an especially designed, small gauge, hollow needle.* The cells, blood and tiny fragments of tissue entrapped in the bore of the needle were then forced out onto a glass slide with a tightly fitting stylet. Another slide was then pressed onto this material so as to form a thin film and both were immediately dropped into a mixture of equal parts of 95 per cent ethyl alcohol and ether. In instances where it was necessary to mail the slides, glycerine preservation, as recommended by Ayre,[6 7] was successfully employed.

Though several methods of staining were explored, it soon became apparent that the usual hematoxylin-eosin and the Papanicolaou technics were best adapted. The latter stain was more acceptable, especially to the cytologist who was more familiar with its delineation of malignant cells.

After fixation the slides were handled by a tissue technician in a general laboratory in the routine manner of Papanicolaou staining[1 8 9] as modified by Graham.

The material constituting this report was obtained from office patients, a local clinic and in a considerable number of instances supplied by dermatologists* located elsewhere. In each lesion the ultimate diagnosis was based upon a satisfactory surgical biopsy.[10] Most of the interpretations of the pathologic specimens were made by one pathologist (T. B. W.) though a number were from written reports accompanying material sent in. In all instances the clinical diagnoses and pathologic interpretations were entirely independent of, and unknown to, the cytologist (A. S.) who examined the smears. The cytologist's training had been confined largely to the cytodiagnosis of malignancy in the female genital tract and included no experience in histopathology.

The material presented here represents the examination of 139 cytologic specimens. However, because of some improperly prepared slides, which frequently showed no cells or in which the material had dried before fixation, the final analysis is based on the first 100 suitable cases. These furnished 107 specimens, representing both malignant and nonmalignant lesions.

An evaluation of the accuracy of cytodiagnosis in skin malignancy in this particular study can be seen in *Table 1*. Here it is shown that if type of malignancy is not taken into consideration, there is a correlation of 76.9 per cent in the malignant group and 71.4 per cent confirmed as nonmalignant. This performance is probably not

*Sixteen-gauge 1½ inch, no bevel, but sharp edges with tight stylet.

*We wish to thank the following for kindly supplying us with smears and their pathologic diagnoses: Dr. J. L. Callaway and staff; Drs. Elliott and Welton; Dr. D. C. Smith and staff; and Drs. Steiger and Brown.

CYTOLOGIC CONFIRMATION OF MALIGNANCY AND NONMALIGNANCY

Total number lesions	107 (100 cases)
Pathologic diagnosis of malignancy	65
Confirmed by cytologic examination	50 (76.9 per cent)
Pathologic diagnosis of nonmalignancy	42
Confirmed by cytologic examination	30 (71.4 per cent)

Table 1

significantly inferior to that generally realized in the more usual fields of cytodiagnosis considered as a group (vaginal, gastric, urinary, bronchial).

A more critical evaluation must take into account ability to differentiate the several types of cutaneous malignancy on a cytologic basis. *Table 2* shows that of 65 pathologically malignant skin lesions, a confirmation of squamous cell carcinoma was obtained in 57.1 per cent, of basal cell in 38.7 per cent and of mixed (baso-squamous cell carcinoma) in 47.3 per cent. However, it is to be noted that in those lesions which histologically showed malignant characteristics in both basal and squamous cells, the cytologist was able to discover malignancy of one or the other type in a total of 89.5 per cent. Malignant melanoma was represented by only one specimen which the cytologist erroneously interpreted as to type but recognized evidence of malignancy.

The cytologic evaluation of nonmalignant cutaneous lesions serves as a reasonable control, since, as shown in *Table 3,* the correlation is approximately the same as in the malignant group. In this case 71.4 per cent were correctly interpreted as nonmalignant.

If the small number of examinations is representative, a composite view of *Tables 2* and *3* sheds light on the greatest difficulty of cytodiagnosis of malignancy in cutaneous lesions. Here it is seen that the failure to confirm malignancy, and conversely the mistinterpretation of nonmalignant cells, occurs chiefly betwen neoplastic basal cells and nevus cells, often a difficult differentiation to make histopathologically.

Cytologic criteria, including variations from normal in the finer cellular details revealed tinctorially and morphologically by the Papanicolaou technic, have afforded the basis of these interpretations. Tissue fragments are frequently encountered in needle puncture biopsies and these were not ignored in this study. In fact these fragments proved of value especially in differentiating between nevus and basal cell carcinoma. The value of such fragments in cytodiagnosis in general has been commented upon by others.[11-14] However, no fragment of tissue was sufficiently large to reveal invasiveness, and the ultimate criteria of malignancy are almost totally manifested by cellular aberrations.

The accuracy of interpretation, especially in regard to nonmalignant skin cells, seemed to in-

NONMALIGNANT LESIONS

Pathologic Diagnosis	Total Number	Cytologic Examination: Non-malignancy Confirmed	False Positive: Squamous	False Positive: Basal
Cheilitis exfoliativa	1	1		
Dermatitis, nonspecific	4	4		
Granuloma, nonspecific	3	2	1	
Gynecomastia	1	1		
Hemangioma, sclerosing	2	2		
Histiocytoma	1		1	
Keratosis seborrheica	8	6		2
Keratosis senilis	2	1		1
Lichen planus	1			1
Lupus erythematosus, acute	2	2		
Molluscum contagiosum	1	1		
Nevus	8	5		3
Papilloma	6	4	1	1
Psoriasis	1			1
Scleroderma	1	1		
Totals	42	30 (71.4 per cent)	3 (7.2 per cent)	9 (21.4 per cent)

Table 3

MALIGNANT LESIONS

Pathologic Diagnosis	Total Number	Diagnosis Confirmed	Cytologic Examination: Diagnosis Not Confirmed: Non-malignant	Squamous Cell	Basal Cell	Baso-Squamous Cell	Melanoma	Nevus
Squamous cell carcinoma	14	8 (57.1 per cent)	4			2		
Basal cell carcinoma	31	12 (38.7 per cent)	6			9		4
Baso-squamous cell carcinoma	19	9 (47.3 per cent)*	1	5	3		1	
Melanoma	1			1				

*Eight additional lesions confirmed "malignant" (basal or squamous).

Table 2

crease as the review of the lesions progressed. It is thought that continued experience on the part of the cytologist with this type of specimen might ultimately produce a higher percentage of correct readings.[15]

Illustrations of the criteria for cytodiagnosis used in this study, which are essentially the basic ones employed by Papanicolaou[1] and reiterated by Foot[16] and others,[17] to-wit: anisocytosis, anisokaryosis, hyperchromasia and abnormal mitotic figures are presented in several selected photomicrographs.

Fig. 1, representing a smear from a squamous cell carcinoma of the skin, shows reasonably well several of these criteria. The cells are large, there is considerable variation in nuclear size, the nuclear outlines are deeply stained, the chromatin particles are irregularly distributed and tend to "clumping" and the nucleus-cytoplasm ratio is abnormal. In this specimen, variation in nuclear shape is not well demonstrated and there is no evidence of keratinization. The cytologist correctly confirmed the diagnosis.

A second squamous cell lesion is shown in *Fig. 2* which well demonstrates variation in size and shape of cells and nuclei, hyperchromasia and chromatin condensation. Two nuclei in the upper left portion of the field may be in mitosis. The two large masses in the center probably represent superimposed cells rather than multi-nucleation. The cytologist accurately interpreted this slide.

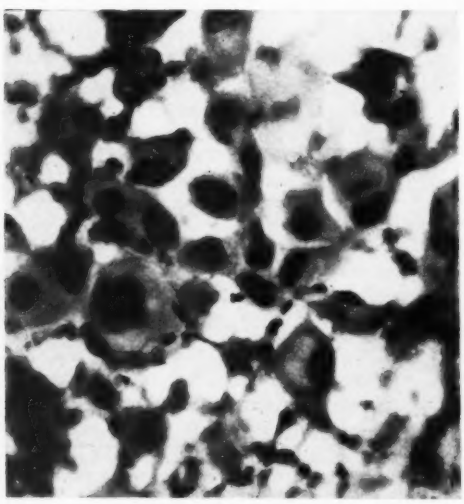

Fig. 1
Squamous cell carcinoma, Papanicolaou stain (900x).

Fig. 3, which was cytologically interpreted as squamous cell carcinoma, was histologically classified as an "intra-epithelial carcinoma." The criteria of malignancy are present and since this particular field represents a tissue fragment, the disorderly arrangement of the nuclei is not an artefact. Pleomorphism is prominent. Several of the hyperchromatic nuclei show the "jagged" contour mentioned by Farber and co-authors.[18]

In the relatively large group of basal cell neoplasms the specimen represented in *Fig. 4* was chosen because it illustrates rather well the few cytologic criteria which seem to be helpful in interpreting these lesions from spread preparations. The fact that there is a great preponderance of basal cells, especially in groups, apparently is significant since this picture probably

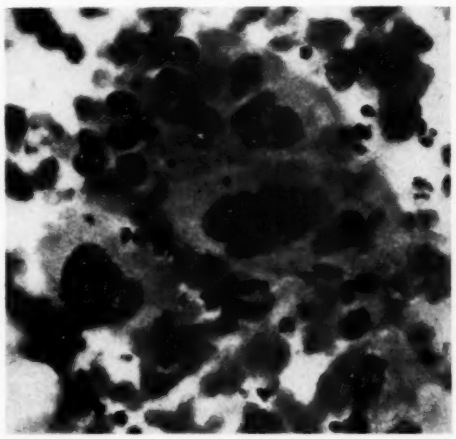

Fig. 2
Squamous cell carcinoma, Papanicolaou stain (900x).

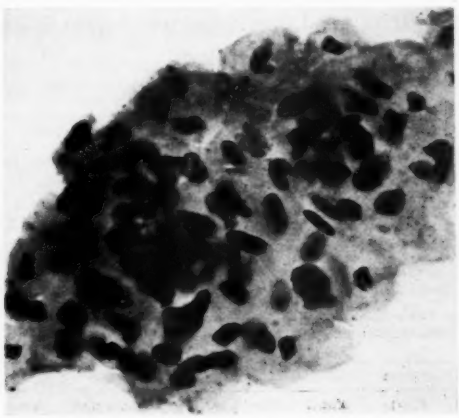

Fig. 3
Intra-epithelial carcinoma, hematoxylin-eosin stain (900x).

does not appear in benign cutaneous lesions. Nuclear hyperchromasia is marked and the "basal cell" character is confirmed by the elongation of the nuclei and palisading, giving a "combed effect."

It is to be noted that in the group of lesions which were classified on histologic basis as "mixed," the cytologist frequently failed to detect malignancy in both cellular elements. However, *Fig. 5* represents a specimen which by cytologic criteria alone was interpreted as "basal cell carcinoma probably with malignant squamous cells." Here is seen anisonucleosis and general hyperchromasia but with considerable variation in density of staining reaction. The basal cells are those with densely stained oval nuclei.

The specimen represented by *Fig. 6* is a smear preparation from a malignant melanoma which cytologically was interpreted as "malignancy, probably squamous cell." Here the nuclear-cytoplasmic ratio shows malignant alteration. Aggregations of chromatin are present as well as marked variation in cellular morphology. The "goblet-shaped" cell in the center of the field suggests the "tadpole cell" described by Papanicolaou as not infrequently seen in squamous cell carcinoma.

Figs. 7 and *8* show smears of benign lesions stained by the Papanicolaou technic. In the first instance the cytologic reading was "keratinized cells." Here the coloration is a strong,

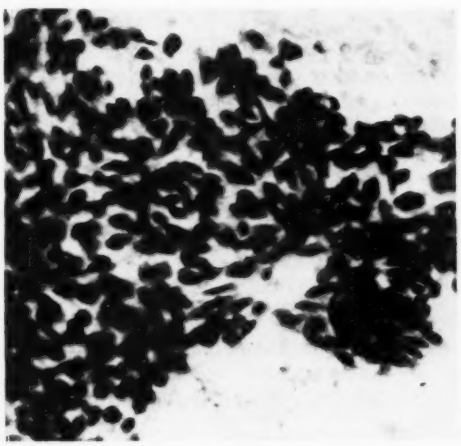

Fig. 4
Basal cell carcinoma, Papanicolaou stain (900x).

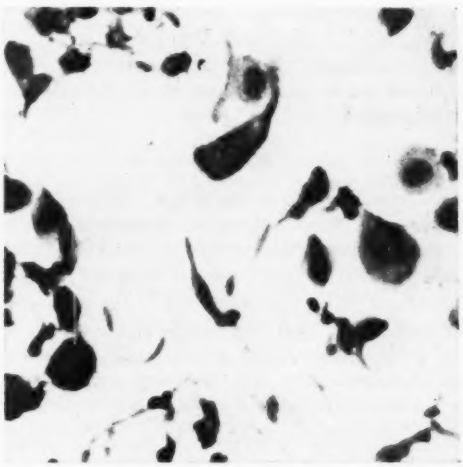

Fig. 6
Malignant melanoma, Papanicolaou stain (900x).

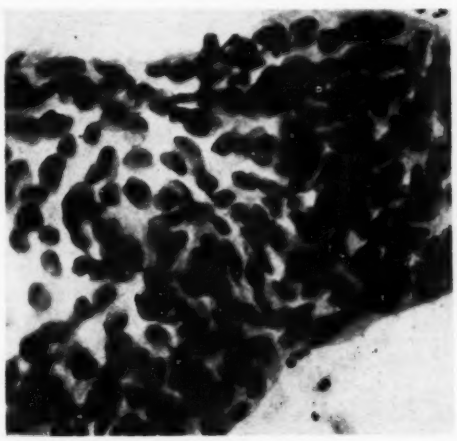

Fig. 5
Mixed cell carcinoma, Papanicolaou stain (900x).

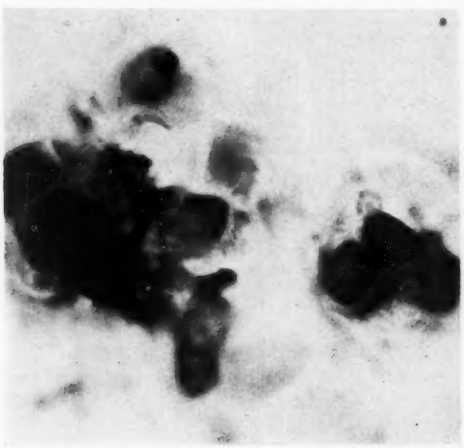

Fig. 7
Molluscum contagiosum, Papanicolaou stain (900x).

orange-yellow (similar to vaginal epithelium in the follicular phase). The keratinization reflects a high degree of differentiation. The nuclei are small and eccentrically situated and the cytoplasm is abundant. This is a lesion of molluscum contagiosum. *Fig. 8* represents a smear from a benign, nonpigmented nevus. The cytologic interpretation was correct for nonmalignancy (the cytologist actually reported this specimen as nevus). The aggregates of cells in some degree resemble those of basal cell carcinoma in that many of the nuclei are deeply stained and oval but there is no palisading and in general the nuclear configuration is more spherical. Cytoplasm is more abundant. Comparison with *Fig. 4* shows considerable similarity and again points up the most apparent difficulty in cytologic evaluation of cutaneous malignancy, the differentiation of basal cell carcinoma and nevus. The confusion seems to be about equally divided in both categories.

COMMENT

There is no intent to endorse a "needle-smear" technic for the diagnosis of cutaneous malignancy. This study is presented merely as an academic exercise in the general field of cytologic recognition of malignancy which for practical purposes began with the identification of exfoliated cells in the female genital tract and since has been extended to include many organs, especially those with excretory or secretory functions. These functions, though possessed by the skin, apparently do not facilitate cytodiagnosis of malignancy in this organ.

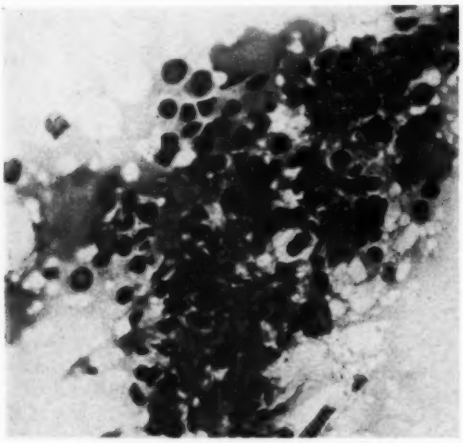

Fig. 8
Nevus, Papanicolaou stain (900x).

In essence, then, this presentation is based on the interpretation of smears of cutaneous cells and extremely small tissue fragments which can be prepared for cytologic examination. Apparently the material is best prepared by Papanicolaou staining technic. Perhaps it is unfortunate that several nonmalignant lesions such as sarcoid, tuberculomas and various pseudo-epitheliomatous hyperplasias were not encountered in this group. One might suppose that cytologic differentiation would be difficult.

It is felt, however, that the degree of accuracy reflected here in differentiating malignant from nonmalignant cells is noteworthy, especially when it is appreciated that each examination was limited to one specimen.

Table 1 presents this material, the original intent of this paper. The other material is more or less an account of ramifications which were explored to some degree. A further study of the value of cytodiagnosis in clinical dermatology simply in detecting malignancy is in progress.

SUMMARY

(1) An evaluation of the accuracy of cytodiagnosis of cutaneous malignancy in 107 malignant and nonmalignant lesions is presented.

(2) Methods of obtaining the smears and staining are briefly discussed.

(3) Performance based on recognition of malignancy alone appears creditable but cytologic confirmation of the type of malignant cell is less impressive.

(4) The greatest source of confusion seems to arise in differentiating malignant basal cells and nevus cells and in detecting both elements in "mixed" carcinoma.

(5) The study is presented for its inherent interest and not as a recommendation for clinical application in dermatology.

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DISCUSSION (*Abstract*)

Dr. Onis G. Hazel, Oklahoma City, Okla.—Dr. Hitch and his co-workers are to be congratulated on being first in the application of the cytologic test to skin cancer using the technic which Papanicolaou has developed for the study of malignancy in other sites. A thorough knowledge of cellular structure in both normal and malignant tissue seems essential in the interpretation of cellular changes of this kind.

It appears that the method they have used to collect specimens for study gives a much more representative cellular material for interpretation than the mere exfoliated cells in uterine and cervical studies to which the Papanicolaou's method has been widely applied.

When I was asked to discuss this paper, I asked the cyto-pathologist, Dr. Walter K. Hartford, of our University Hospitals, for instruction in the method of preparing the slides for study. We have had an opportunity to study basal cell epitheliomas, squamous cell carcinoma and two cases of pseudo-epitheliomatous hyperplasia and tissue smears taken twelve days after 4,500 r. of superficial x-ray therapy.

There was no question of interpretation of malignant cells when they were present in the slide. The cells of both cases of psuedo-epithelioma were definitely benign in appearance. We feel that the greater danger lies in the possibility of not finding malignant cells in the smear of cancer cases, either because they may be overlooked or because the particular smear did not contain cells from the malignant area. This objection can also be raised to any surgical biopsy study. In the cases we have studied there has been complete agreement between the smear and fixed biopsies.

I agree with the authors that this technic cannot and is not intended to replace the time honored fixed biopsy. It is felt that a better knowledge of cellular pathology is so pertinent to dermatologists that this type of cytologic study should be included in the training of dermatology students and perhaps be made a part of the histopathology course offered by our Academy of Dermatology.

Dr. Zola K. Cooper, St. Louis, Mo.—This is the first time that this cytologic technic has been used on lesions of the skin. It is apparently as accurate here as it has been in lesions of other anatomical sites. However, as Dr. Hitch has emphasized, it does not take the place of the biopsy. One cannot tell by this method anything about the depth of invasion of a carcinoma. A variation of this cytologic technic which is sometimes very useful is the touch preparation made from biopsies of suspected lymphomas. The piece of skin is lightly touched to a clean microscopic slide and the resulting smear stained with Giemsa or Wright stain. In the leukemias, a better preparation is sometimes obtained by this method than by the usual paraffin section. The individual cells are not distorted by the dehydration and clearing of the paraffin technic and diagnoses of types of leukemia, for example, are made more readily.

Dr. Charles C. Dennie, Kansas City, Mo.—This paper has added a third dimension to microscopic examination. Professor Tassilo Antoine, the Head of the Department of Women's Diseases in the University of Vienna, has invented a new microscope which can be inserted into the vagina and a direct examination made by vital stain. This microscope consists of two barrels, one on the outside of the other, both silvered. The lighting is between the two barrels; the objective is in a cone-shaped encasement with a flange on the outside so that the light is put on across the tissue like a darkfield illumination.

The instrument is used in this manner: the cervix is wiped and stained with hematoxylin stain. The microscope is inserted; it magnifies 200 diameters. The distal end is pressed down against the lesion and the cells are studied. Antoine has studied not only the normal mucous membrane of the cervix, but also the malignancies and other pathologic conditions that occur there.

The normal mucous membrane of the cervix looks like grandma's old counterpane, with a little tuft placed at regular intervals. This instrument, which I am getting, can be applied to the skin. This same study may be made upon malignancies, with the added advantage of seeing the relation of these cells to each other. The skin is stained with a vital stain, the microscope fastened to a stand and placed against the lesion and the relation of the cells is studied. If the technic is the same as is used on the cervix, the individual cells can be studied closely and the different changes that take place in malignancy can be seen. By the same method, all types of skin lesions may be studied which we do not know much about as far as surface examination is concerned. We can see what the relation of the normal skin cells is. We can also study such diseases as psoriasis, and the many other little understood skin lesions. The examination of all tissue, until Papanicolaou's technic was used, was in two dimensions. This method adds the third dimension. It will be of great value to study all skin diseases by the vital method with this new microscope invented by Tassilo Antoine.

Dr. Hitch (closing).—Dr. Dennie's description of a method for examining cells *in situ* microscopically was entirely new to me and is quite interesting.

We were disappointed that we did not have in our series of negative controls more confusing lesions to test the method further. I have reference particularly to those in the senile keratosis group, sarcoid, and various tuberculodermas. However, these did not appear within the limits of the number of cases which we chose for this presentation.

I should like to take this opportunity to express thanks to those who sent us cytologic smears to add to our group. These were supplied by Dr. Callaway and his staff, Duke University Hospital, Drs. Elliott and Welton of Charlotte, Dr. D. C. Smith and his staff, University of Virginia Hospital, and Drs. Steiger and Brown of Charlotte. We were particularly happy to have these specimens since they represented an absolute method of preventing the cytologist from being influenced by opinions expressed as to the clinical or histologic diagnosis of the case under consideration.

DIGITALIS IN HEART DISEASE*

By HERBERT L. CLAY, JR., M.D.
Louisville, Kentucky

Dr. Leonard Fuchs, in 1542, gave the foxglove plant the botanical name Digitalis purpurea because of the purple color and resemblance of the blossoms to a finger. Foxglove was used by the Welsh physicians as early as the thirteenth century and was given for a variety of totally unrelated diseases such as epilepsy, ulcers, wounds and tuberculosis. However, in 1785, William Withering published his classical treatise concerning ten years of experience with digitalis. He advised its use primarily as a diuretic, although recognizing its cardiotonic action, and he said:

"That it has a power over the motion of the heart to a degree yet unobserved in any other medicine and that the power may be converted to salutary ends."

These observations of 175 years ago are still true at the present time.

Digitalis preparations most commonly in use today are: (1) whole leaf preparations of Digitalis purpurea; (2) purified glycosides by themselves (such as digitoxin or lanatoside C); or (3) combinations of glycosides (digilanid prepared from Digitalis lanata). With the introduction of the various purified preparations there started into the offices of practitioners an almost steady stream of detail men each extolling the advantages of his firm's products. At the same time a tremendous number of controversial articles began to appear in the literature. It is little wonder that many began to lose confidence in their knowledge of digitalis. This is not a new state of affairs and at this point I believe it is appropriate to quote from Withering's article written in 1785:

"The ingenuity of man has ever been fond of exerting itself to vary the forms and combinations of medicines. Hence we have spiritous, vinous, and acetous tinctures; extracts hard and soft, syrups with sugar or honey, etc., but the more we multiply the forms of any medicine, the longer we shall be in ascertaining its real dose."

At this time it might be well to refresh our minds on certain pharmacologic and physiologic facts related to the two digitalis species. *Fig. 1** shows the plant Digitalis purpurea and you may note that from this species the glycosides digitoxin, gitoxin and gitalin are derived.

*Fig. 2** shows Digitalis lanata and from this species are derived the glycosides, digitoxin, gitoxin and by hydrolysis of lanatoside C, digoxin.

As can be seen from these figures the same glycosides are derived from the two species of digitalis with the exception of gitalin and digoxin the former being derived from purpurea and the latter from lanata. The glycoside content of Digitalis purpurea is considerably smaller than that of Digitalis lanata and for this reason most of the purified glycosides are prepared from Digitalis lanata. The remarkable variability in composition of different specimens of digitalis of the same species when grown in different localities can be readily seen in the charts prepared by Kreis which show that the proportion of digitoxin to gitoxin varies by as much as from 0.012 to 63.0 in plants of the same species grown in different localities. The marked variability of therapeutic potency of different whole leaf preparations of digitalis has given the major impetus to the effort to prepare a product of standard and constant composition and therapeutic effect. Kreis also showed the proportion of lanatoside A to lanatoside C is quite variable depending on the locality in which the digitalis lanata plants are grown.

Briefly, some of the actions of digitalis may be summarized as follows: (1) the most important pharmacodynamic action of digitalis is to enhance the force of systolic contraction of the diseased and dilated heart by its direct action on the myocardium. The improved cardiac efficiency and state of circulation results in an improved coronary flow thus lessening the partial myocardial anoxia. Consequently the myocardial

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*Photographs of the digitalis plants from *Digitalis and Other Cardiotonic Drugs* by E. R. Movitt. Copyright 1949 by Oxford University Press, Inc. Reproduced by permission of the author and publisher, and through the courtesy of the Sandoz Chemical Works.

excitability is reduced and this in turn raises the threshold for activation of the ventricles by auricular impulses. (2) The next most important effect is on conduction tissue. The refractory period is prolonged and conduction rate is decreased. Slowing of the heart rate with small doses of digitalis is effected through action on the vagus but slowing with large doses is extravagal and is not influenced by atropine or exercise. This was demonstrated by Gold and can be seen quite well by referring to *Tables 1* and *5* in his paper in the *Journal of the American Medical Association* in 1946. For many years, following the work of Mackenzie, digitalis was used almost exclusively for its effect on rate and rhythm. The entire beneficial effect of digitalis even in rapid auricular fibrillation is not due solely to its effect on auriculoventricular nodal tissue. (3) Digitalis, when administered to patients in congestive heart failure with a decreased cardiac output increases the functional capacity of the heart. The cardiac output is increased. The circulation time is shortened and the venous pressure if initially elevated is reduced. In normal hearts this is not true. (4) Digitalis through its effect on the circulation may suffice to produce satisfactory diuresis and disappearance of edema in patients with congestive heart failure. Digitalis does not produce diuresis in normals or subjects without heart failure. (5) The effects of digitalis on the electrocardiogram are myriad and may simulate almost any pattern produced by disease.

TOXIC EFFECTS

These were so well described by Withering that I shall again quote from his original account.

"The foxglove when given in very large and quickly repeated doses, occasions sickness, vomiting, purging, giddiness, confused vision, objects appearing green or yellow; increased secretion of urine, with frequent motions to part with it, and sometimes inability to retain it; slow pulse, even as slow as 35 in a minute, cold sweats, convulsions, syncope, death.

"When given in a less violent manner, it produces most of these effects in a lower degree; and it is curious to observe, that the sickness, with a certain dose of the medicine, does not take place for many hours after its exhibition has been discontinued; that the flow of urine will often precede, sometimes accompany, frequently follow the sickness at the distance of some days, and not unfrequently be checked by it. The sickness thus excited, is extremely different from that occasioned by any other medicine; it is peculiarly distressing to the patient; it ceases, it recurs again as violent as before; and thus it will continue to recur for three or four days, at distant and more distant intervals.

"But these sufferings are not at all necessary; they are the effects of our inexperience, and would in similar circumstances, more or less attend the exhibition of almost every active and powerful medicine we use.

"The patients should be enjoined to drink very freely during its operation. I mean, they should drink what-

Fig. 1

Fig. 2

ever they prefer, and in as great quantity as their appetite for drink demands. This direction is the more necessary, as they are very generally prepossessed with an idea of drying up a dropsy, by abstinence from liquids, and fear to add to the disease, by indulging their inclination to drink."

From the previously summarized effects of digitalis the indications, nonindications, and contraindications become fairly obvious. These are shown in *Tables 1, 2* and *3*.

It might be pointed out that the chief indication for digitalis is congestive heart failure particularly when associated with low cardiac output. It is also indicated in auricular fibrillation, particularly if this is associated with heart failure. Auricular flutter and paroxysmal auricular tachycardia if not controlled by other methods may also be an indication for digitalis (*Table 1*).

The entities listed as nonindications for digitalis are only a few of the conditions which in themselves are not indications for digitalis therapy. However digitalis is commonly used in these conditions and sometimes to the detriment of the patient (*Table 2*).

The four conditions shown as contraindications to digitalis therapy are fairly well agreed upon. Schem recently reported on the use of digitalis in patients with ventricular tachycardia and although he felt that there were no harmful results from the procedure I believe that the general opinion is contrary to this view (*Table 3*).

INDICATIONS FOR DIGITALIS
(1) Congestive heart failure
(2) Auricular fibrillation
(3) Auricular flutter
(4) Paroxysmal auricular tachycardia

Table 1

NONINDICATIONS FOR DIGITALIS
(1) Sinus tachycardia—febrile, toxic
(2) Sinus arrhythmia
(3) Pneumonia
(4) Rheumatic fever
(5) Beri beri
(6) Constrictive pericarditis
(7) Preoperative routine prophylaxis
(8) Postoperatively for cardiovascular collapse, tachycardia or premature beats
(9) Coronary artery disease with angina
(10) Acute coronary thrombosis

Table 2

With this background we might discuss the preparations that are available to us and the methods of administering these preparations. I have summarized some of the information concerning these preparations in *Table 4*.

We are all familiar with the difference in action of regular, globin, and protamine zinc insulin and a fairly good analogy can be made between insulin and digitalis. Protamine zinc insulin is more slowly absorbed and maintains its effect for a longer period of time than regular insulin and is thus comparable to powdered whole leaf digitalis. Once toxicity has been reached the dangers of these toxic effects are present for a long period of time.

Regular insulin on the other hand is rapidly absorbed and acts for a relatively short period of time. This is likewise true also for digoxin and lanatoside C. Furthermore with these preparations the danger of toxic effects is present over only a short period of time. This analogy may be carried even to the method of administration because in order to achieve satisfactory maintenance one must give divided daily doses of both regular insulin and digoxin where as because of their prolonged action single daily doses of protamine zinc insulin or digitalis leaf are satisfactory for maintenance.

CONTRAINDICATION FOR DIGITALIS
(1) Digitalis intoxication
(2) Ventricular tachycardia
(3) Recurrent Adams-Stokes attacks
(4) Carotid sinus hypersensitivity

Table 3

	Digitalizing Dose		Daily Maintenance Dose
Preparation	Oral	Intravenous	
Powdered whole leaf USP XIII	1.2-2.0 grams 12-20 cc.		0.1 gram tablet 1 cc. tincture
Digilanid	3.0-8.0 mg. in 48 hours	3 mg.-6 mg. 0.8 mg. bid for 2 days	0.33 mg.
Digitoxin	1.2-2.0 mg.	Av. 1.2 mg.	0.1-0.2 mg.
Digoxin	Av. 3.75 mg. in 24 hours 2.0-5.0 mg.		0.5-0.75 mg.
Lanotoside C	Av. 6.0 mg. in 48 hours	Av. 1.6 mg.	0.5-1.5 mg. orally or 0.4 mg. every 6 hours I.V.

Table 4

Digilanid and digotoxin occupy an intermediate position between digoxin and whole leaf digitalis in that they are fairly rapidly and completely absorbed yet have a prolonged effect perhaps analogous to globin insulin. They have the same advantages in regard to maintenance therapy but also the disadvantage of prolonged toxic effects once the level of toxicity has been reached.

Unfortunately many physicians who have been besieged by detail men in recent years have gained the erroneous impression that digitalization and maintenance with digitoxin can be simplified and standardized for all patients to 1.2 mg. in a single dose followed by 0.2 mg. daily maintenance dosage. This has brought about a considerable number of instances of both over- and under-digitalization because such a routine fails to account for such variations as age, size of the patient, primary disease in the patient and so on.

Table 5 shows in general the amounts of various digitalis preparations necessary for 24-hour digitalization and maintenance. These are not absolute requirements for all individuals and regardless of the preparation used we must keep in mind the characteristics of the particular preparation and the exact end result that we hope to accomplish with it.

The dosages listed here are certainly only general guides and it must be borne in mind that the range is quite wide on both sides of these figures. This type of digitalization should be reserved for those patients with rather severe long standing failure. If one is dealing with an acute severe congestive failure, particularly one due to an acute auricular arrhythmia, lanatocide C intravenously may be used and expected to cause a rate reduction in from a few minutes to a few hours.

Again it should be emphasized that after the initial dose, the drug should be given in appropriate dosage until the proper therapeutic effect has resulted or toxic manifestations begin to appear. Therapeutic results include reduction in an elevated venous pressure, disappearance of edema, reduction in liver size, disappearance of râles, ventricular rate of 70-80 particularly in those who have had rapid ventricular rates with auricular fibrillation.

TWENTY-FOUR HOUR DIGITALIZATION

	Average	Initial Dose	Every Six Hours Until Desired Effect
Digitalis leaf	1.2 gm.	0.6 gm.	0.2 gm.
Digitoxin	1.2 mg.	0.6 mg.	0.2 mg.
Digoxin	3.75 mg.	2.0 mg.	0.5 mg.
Lanatoside C (I. V.)	1.6 mg.	0.8 mg.	0.4 mg.

Table 5

CONCLUSIONS

(1) Digitalis preparations are still the cardiotonic principle of choice in the treatment of congestive heart failure.

(2) There are theoretical advantages and disadvantages to the whole leaf preparation, digitoxins and digoxin or lanatoside C.

(3) One would be far better off to administer the preparations on the basis of sound knowledge as to the effects that he desires to achieve and the toxic effect that he desires to avoid.

(4) Expertness in the administration of one or two preparations is to be desired over the ability to administer 6 or 7 preparations inexpertly.

DISCUSSION (*Abstract*)

Dr. Michael R. Cronen, Louisville, Ky.—Dr. Clay has condensed a controversial and difficult subject into a clear, word and visual picture. He has untangled the complexities of the recent influx of newly promoted digitalis derivatives.

He has pointed out the active ingredients of Digitalis purpurea and lanata which, under various trade names, confusingly come to our daily attention. In spite of purity and standardization, the dosages are different, as seen by Dr. Clay's tables. One can easily be confused by these various oral preparations unless he is well acquainted with the particular product. Therefore, I strongly suggest: choose one, and only one, digitoxin. Learn all about it, and stick to it.

Knowing that all digitoxin products are excellent, and certainly a great improvement in purity and absorptive quality over the whole leaf, I should like to ask Dr. Clay whether he has a preference and why?

From our earliest days in school we studied the dry whole leaf. We have used it successfully in spite of somewhat more frequent gastric symptoms, and I cannot completely supplant it. It has stood the test of time for 175 years. I sometimes wonder whether the so-called undesirable early gastric symptoms, especially anorexia, may be a blessing, and deserve praise, since they warn us further in advance than the purer products do. I would like to ask Dr. Clay his opinion and personal use of the dried leaf.

Here, too, may I repeat a popular belief that 1.2 mg. of digitoxin is the safe average digitalizing dose? This is not true and was not the original opinion of investigators. With this dose 25 per cent of patients will be overdigitalized and 25 per cent underdigitalized. There are many variables, as Dr. Clay said: size, age,

condition of the patient, detoxifying power of the liver, kidney function, and so on. I urge you to accept every new candidate for digitalis therapy as an individual. I should recommend the fractional method, in most cases, as suggested by Dr. Clay's 24-hour digitalization chart. You can calculate, by virtue of the 100 per cent absorbability of digitoxin, how much drug it takes for full digitalization or toxic symptoms to appear, but you cannot predict when this effect will occur. It may be with 1.0 or 1.5 mg. There is no set dosage; there are only relative amounts. Incidentally, it may be quite wise to have the patient help in the procedure by acquainting him with the earliest symptoms of optimum effect and mild toxicity, the margin of which is small but usually definite and easily detectable. I believe in teaching the patient to take his pulse and to recognize variations. We teach them to use insulin; why not digitalis?

Dr. Clay said that any known pattern of electrocardiogram can be reproduced by digitalis. Indeed, digitalis can and does produce any known arrhythmia, and a cumulative effect of its uninterrupted use can produce the same symptoms for which treatment has originally been instituted. Some of these can be observed at times on physical examination of the pulse, even by the patient himself.

Dr. Clay (*closing*).—We are going over our data at the present time comparing various digitoxin preparations. Perhaps a year to a year and a half ago I could have answered the question of preference rather easily, and said that digitaline nativelle® was our choice. In the past months, however, I believe that the other preparations such as purodigin® and many others have been improved in standardization and purity, and I can see very little difference in these preparations.

In the majority of cases we still use digitalis whole leaf. However, when there is a need for fairly rapid digitalization within twelve to twenty-four hours, we use digitoxin. For those individuals with acute auricular fibrillation, paroxysmal auricular tachycardia, or when we are interested in a very rapid effect for a short duration we use lanatoside C.

THE EFFECT OF DIGITALIS AND OTHER DRUGS ON HEART CONTRACTILE FORCE: CLINICAL IMPLICATIONS*

By ROBERT P. WALTON, M.D.
and
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Heart contractile force is obviously one of the most critical functions of the circulatory system. Reliable knowledge as to changes in heart contractile force can be of decisive importance in various clinical conditions and particularly in those which involve the action of drugs. Such knowledge in the case of humans must necessarily be obtained by indirect methods.

Clinical determinations of cardiac output by catheterization sampling and blood oxygen determinations according to the Fick procedure is now an accepted practice. Cardiac output or stroke volume determinations, however, represent the composite of several factors of which heart contractile force is only one. Actually, it has been demonstrated that a drug such as amyl nitrite may considerably increase heart output almost entirely through its dilating action on the peripheral vascular bed.[1] Conversely, epinephrine, which is known to increase heart contractile force several fold, may at the same time produce a decrease in cardiac output through the predominance of its constricting action on the peripheral vascular bed.[2,3] Attempts to estimate contractile force through simultaneous determinations of cardiac output and arterial pressure may be subject to serious fallacies due to changes in diastolic size and uneven changes in peripheral tone through the various vascular beds, both arterial and venous. Other factors, such as changes in valvular competence, can completely invalidate conclusions based simply on output and pressure.

Experimental analysis of ballistocardiograph tracings have indicated that they may be used to estimate contractile force with greater validity than they estimate cardiac output.[4] Such concept, recently developed and necessarily requiring further confirmation, is clearly capable of wide and valuable applications.

Because electrocardiographic records may show decrease in R-wave voltage during stages of myocarditis or in the "beri-beri" heart, there has been an impression that electrocardiographic records can give an indication of heart contractile force. In our experience, R-wave voltage in certain conditions may show some approximate parallelism with contractile force changes. This, however, is purely circumstantial and we have also many times seen these two manifestations change in opposite directions. We have even observed typical electrocardiographic complexes with good R-wave amplitude in a heart which had ceased to beat. This extreme separation of conducting tissue excitation and muscle contraction was obtained during special conditions of acute anoxia. Under the influence of

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digitalis we have observed substantial increments in heart contractile force without significant alterations in any feature of the electrocardiographic complexes. The reverse situation, however, (electrocardiographic changes without contractile force increments) does not occur unless the heart is rapidly thrown into disorganization with massive doses of digitalis. Measurement of RS-T and T-wave changes[5] and calculations of ventricular gradient[6] have been tested as possible assay methods for digitalis in specially selected subjects. Such methods, developed to a reliable degree, will probably indicate contractile force changes to the extent that they reflect the extent of digitalis action in those particular subjects. They do not, however, represent an inherent measure of contractile force changes and have not been proposed as such. Katz,[7] in his comprehensive monograph, has said that "there is nothing in the electrocardiogram that gives any information, except inferentially, concerning the property of contractility."

Pressure measurements within the right ventricle are now a safe procedure in humans and have also been carried out in the left ventricle, but at more risk to the patient. Maximal pressures thus recorded give some indication of contractile force but are largely influenced by peripheral resistance. With the aorta occluded, however, maximal pressures in the left ventricle may be considered to be more a function of contractile force. Some animal experiments of this sort have been described by Gold and Cattell.[8] Stable preparations with this arrangement have not been developed. They are somewhat similar to early experiments using isolated perfused hearts into the ventricles of which have been inserted balloons connected directly to manometers. Such experiments showed that digitalis increased maximal pressures by twofold.[9] Apart from any consideration of maximal pressures in the ventricle it is important to recognize that there has been clear demonstration that digitalis and epinephrine produce a distinct increase in the pressure gradient or the rate in which pressure rises in the ventricle during systole. These observations have been precisely described by Wiggers and Stimson[10 11] using open-chest dogs with a metal cannula inserted directly through the ventricle wall. The present catheterization technics in patients might effectively measure these gradients but such observations are now seriously handicapped by the inertia of the fluid column in the catheter. The use of pressure-sensitive tips with electrical transmission of impulses in such catheters will no doubt make such clinical studies more practical and profitable.

There is a wide variety of laboratory methods which give fundamental information on contractile force changes produced by drugs. The basic knowledge of drug effects has been largely developed through experiments with isolated strips of heart muscle, with isolated hearts sustained by coronary perfusion and with heart-lung preparations. These artificial conditions, however, make it difficult to transfer interpretations involving dosage, time effects, and so on to the patient.

The present report is intended to present results with a unique laboratory method using the intact, unanesthetized dog.[12 14] The cardiovascular responses of this animal are generally considered to be close to those of the human. Although some quantitative differences involving peripheral vascular system responses have been described,[15] the cardiac responses appear to be closely similar. Accordingly, the method described here is offered as one whose results are capable of reasonably valid application to clinical problems. This is particularly true of clinical situations in which acute drug responses are obtained in a healthy myocardium. The method consists essentially in the surgical attachment of a small metal arch to the anterior aspect of the right ventricle. A strain gauge coil cemented to the outer surface of the arch undergoes changes of electrical resistance which, within limits, are proportional to the force of contraction between the two points of attachment on the heart wall. These electrical changes are transmitted through wires brought out the chest wall and recorded directly by electronically actuated writing levers. Animals prepared in this way are subject to no important disability and have been used in experiments lasting several weeks. During this time fibrous tissue may so cover the metal arch that it appears to be incorporated in the heart wall and only the wires leaving the heart muscle can be seen.

Circulatory function is not perceptibly affected by this one-inch strip of metal fixed to the ventricular wall. The only perceptible electrocardiographic changes occur when precordial leads are taken from positions directly over the bar. Starr[16] has shown that large sections of the right ventricle can be destroyed with no significant alteration in circulatory function and these observations have been extended by Bakos.[17]

This method gives a figure in grams which represents the force of contraction as it is exerted on the two points of attachment of the arch. The absolute quantitative value of the measurements is affected not only by the inherent strength of that particular heart but will vary considerably with the position of attachment and the extent of stretch or slack between the two points of attachment. The significance of the observations has been primarily limited to measurement of changes produced by drugs or special maneuvers. Relative changes thus measured are considered to represent with reasonable validity the changes taking place in the entire right ventricle and, in good probability, the measured changes are representative of those in both ventricles.

The most important limitation on the validity of these measurements comes about when there are changes in heart size. These can grossly affect the quantitative value of the measured changes. This feature, however, can be taken into account in several ways. For instance, in most of our studies the closed-chest experiments have been supported by a similar series of experiments in open-chest animals in which the same type of measurement was made using modified levers of the Cushny type which afforded sensitive measurement of the changes in initial diastolic length of the muscle between the two points of attachment. Such observations provided evidence bearing on the size changes which might be expected from various drugs or experimental maneuvers. They provided good basis for concluding that size changes of serious importance did not occur following administration of certain drug doses on which we have particularly concentrated our attention. It is also possible to construct a device which measures both contractile force changes and size changes in the intact animal, and we have carried out a few experiments with such an arrangement, but at present do not have it on a practical working basis.

RESULTS

It has been demonstrated by our studies that cardiac glycosides produce consistent and substantial increments in contractile force at dose levels lower than those producing any significant electrocardiographic changes.[12] The implications here are several. For instance, there is less need to postulate some extracardiac effect of digitalis as being responsible for its therapeutic action. It has been proposed that contractile force changes occur only at toxic levels. The effect at therapeutic levels has been ascribed to liver reservoir action, and, again, to decreased venous pressure. It has also been demonstrated that digitalis causes a significant shift of fluid from plasma and tissue cells to extracellular spaces.[13] These various effects can be accepted as occurring under some conditions, and may be a component in the digitalis effect, but the dose levels of our experiments indicate that the direct cardiac action is the primary effect. Further, these observations constitute a satisfactory explanation for those instances in which decompensated patients show clinical improvement with digitalis doses lower than those producing electrocardiographic changes.

It has been common experience during our observations to note a decrease in contractile force after digitalis effects reach an optimum level. This is clearly the result of the disorganization of contractile components at toxic levels and does not ordinarily occur without important electrocardiographic evidences of such disorganization. These observations have given graphic evidence of the clinical experiences described by Batterman and Guttner,[18] in which certain patients were consistently thrown into decompensation by an increase in digitalis dose and, again, were restored to compensation when the dose level was reduced.

Comparison of several cardiac glycosides in both closed- and open-chest experiments have demonstrated several features of interest. Following intravenous administration, digitoxin is slowest in developing the maximum effect on contractile force. This effect ordinarily occurs in about 40 minutes under our experimental conditions. It is probable that the maximum effect occurs less rapidly in patients. Digoxin has about the same period of action. Ouabain and lanatoside C act somewhat more quickly. Thevetin, which is available only on an experimental basis, is clearly the most rapid in onset. As might be expected and as is generally understood clinically, digitoxin is most sustained in its action and thevetin least sustained.

The therapeutic index of these glycosides may be defined as the ratio of the dose producing fatal fibrillary effects to the dose producing a certain designated increase in contractile force. An extensive experimental series failed to demonstrate any significant difference in this index with these common glycosides. Possibly a still more extensive and rigorously controlled study

would bring out an acceptable difference in the relative effectiveness and safety of these drugs. For the present, we accept these drugs as being equal in this respect and do not consider that there is any satisfactory laboratory or clinical demonstration that any one of these common glycosides is superior to another in this fundamental particular.

Our experimental methods of measuring the therapeutic index just mentioned have demonstrated a significantly lower index in the case of one of the erythrophleum alkaloids, coumingine. At the same time, other components of erythrophleum have at least as high an index as the usual cardiac glycosides.[19] This group of drugs is unique in being the only class of alkaloids, or compounds other than the cardiac glycosides, which exhibit typical digitalis actions.

As compared with the cardiac glycosides, some of the sympathomimetic amines exhibit a higher degree of cardiac stimulation with a distinctly lesser degree of rhythm irregularities and tendency to ventricular fibrillation. We have been favorably impressed with the characteristics of one of these, 2 methyl-amino-6-hydroxy-6-methyl heptane (aranthol) when used as a cardiac stimulant in acute emergencies such as occur in anesthetic depressions.[20] Such compounds merit further clinical trials of this sort.

Arrhythmias and terminal ventricular fibrillation represent the limiting factor for most of the cardiac stimulant drugs. The anti-fibrillatory drugs, on the other hand, have as their limiting factor the degree of myocardial depression which they must inescapably produce. Quinidine, procainamide (pronestyl), procaine and diethylamino ethanol all have the effect of counteracting ventricular arrhythmias due to cyclopropane-epinephrine combinations and also the more common conditions, arrhythmias after coronary occlusion and digitalis intoxication. The relative safety of these compounds has not been defined. We have studies under way aimed at determining their relative effectiveness in antagonizing digitalis arrhythmias and at the same time comparing the degree of cardiac depression they produce. Tentatively, it may be said that they have a good margin of safety as regards the degree of cardiac depression produced at ordinary dose levels. Procainamide has shown promising characteristics in preliminary trials.

In contrast, the intravenous barbiturates have shown such pronounced depression during the injection interval as to suggest even greater emphasis than is sometimes placed on the necessity for slow, gradual administration. Further studies along the lines of anesthesiology have emphasized the cardiac depressant and dilating action of carbon dioxide. This occurs to a significant degree in concentrations which may be developed in certain unfavorable conditions of anesthesia. Graded administration of progressively diminishing oxygen concentrations has furnished some tentative support to suggestions that diminished partial pressure of oxygen in mixed venous blood serves as a stimulus which results in an increased cardiac output.[21] Such effect, however, is not large and, at best, is limited to a narrow range of hypoxia beyond which there are substantial grades of cardiac depression.[22]

A curious finding is the marked grade of cardiac stimulation produced by a calorigenic agent such as dinitrophenol. This drug can increase contractile force by two- to threefold in extreme instances. These same effects are produced by dicumarol, which in doses much above the therapeutic range have generally similar calorigenic actions as dinitrophenol.[23] The stimulant effect is diminished but distinct when the hyperthermia is neutralized by ice packs and is evidently due in considerable part to the increased metabolic activity occurring directly in the myocardium. Conceivably, increased metabolic activity in the adrenal glands may also contribute to this effect through an unusually sustained discharge of epinephrine.

At the same time, heart contractile force is significantly increased by hyperthermia independent of this special local calorigenic action. For instance, the application of diathermy has been shown to produce such effects. The degree of stimulation produced by this latter means is not so great as with the usual stimulant drugs, and deterioration of heart force is more rapid under these conditions. These methods can be used to obtain more quantitative expressions of the increased burden of the heart during febrile states.

SUMMARY

A method has been described for directly measuring changes in contractile force of the right ventricle in intact, unanesthetized animals. Several clinical implications are discussed based

on experiments carried out with common drugs and with diathermy.

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DISCUSSION (*Abstract*)

Dr. Donald E. Gregg, Washington, D. C.—It is not necessary to stress the importance of precise measurements of the contractile force of the heart, for upon such measurements must be based much of our understanding of the physiology of the heart and the rationale of cardiac drug therapy.

In the past various means have been devised to study myocardial contractility. The state of contractility has been deduced from the relation of atrial pressure and cardiac output, of diastolic size and stroke volume, from measurement of the force of isometric contraction of a strip of isolated heart muscle, and from measurement of the pressure pulse within an artery segment embedded in the myocardial wall of the beating heart. Each approach is known to have drawbacks and deficiencies. Some have suffered from the presence of artefacts which could not be removed, others in their use have necessitated considerable removal of the myocardium from its normal environment.

I can see nothing wrong with the principle of the method just presented at this meeting of measuring the systolic myocardial contractile force in the open- or closed-chest animal. Measurement of the force it takes just not to prevent myocardial fibers from shortening should be valid as an index of contractility or systolic contractile force in those fibers. However, to be of much use such a measurement must be representative of the contractile state in the whole ventricle. The muscle fibers to which the myograph is applied are few in number and are connected to the large bulk of remaining myocardial fibers of the particular ventricle. It does not necessarily follow that changes in the contractile force in this small group of fibers is representative of the whole ventricle. That such a correlation may at times not exist is suggested by the published experiments with this method which indicate during pulmonary artery stenosis a decrease in initial length of the right ventricular muscle segment between the two arms of the myograph. To answer this question properly, it might be helpful to apply simultaneously several myographs to a ventricle and then to observe whether the directional changes in systolic contractile force to an experimental variable are the same in the different myocardial regions.

Cardiodynamic variables which affect the systolic force of the myocardium can arise either in the heart muscle or they can have an extra cardiac origin. For the method to be of greatest value there must be some means of knowing to what extent the changes observed in contractility have their origin in the myocardium and to what extent they are secondary to extra cardiac factors. Surprisingly enough various potential extra cardiac influences such as heart rate, venous pressure, blood pressure and venous return were found in general to have only a small effect on the contractility of the heart, and hence under most circumstances the myographic arrangement follows only changes in systolic force arising within the myocardial mass. It seems strange that the changes in length or tension of cardiac muscle fibers which these extra cardiac variables must induce can have so little effect on the contractility of the heart. From these observations I would have the impression that the method might be a somewhat insensitive indicator of events and that it indicates only rather gross changes in the state of myocardial contractility.

Dr. Arthur S. Gilson, St. Louis, Mo.—The history of cardiac physiology and of cardiac pharmacology have progressed as there has been progress in experimental technics. Yet the functioning of heart muscle and the action of drugs on this functioning still remain as pregnant causes of heated discussion as do religion and

politics. The clinical application of the information gained from experiments has remained in a still more disputable state. The South Carolina group, using more or less intact animals, applied an important modification to an old technic in their measurements of isometric systolic tension by means of the so-called Cushny lever system. Their records show not merely the shortening of a right ventricular muscle segment but also, by application of an opposing spring force, a measure of the isometric tension developed by the segment. This latter value is an important one in evaluating the performance of the cardiac muscle and it is frequently neglected. One must recognize the fact that such a record is made from a sample segment of heart muscle. This sample is admittedly not completely free from the influence of other parts of the heart. Neither is it of such constant or known dimensions that the data obtained can be put into standardized terms. This difficulty is circumvented by what appear to be adequate controls.

It would certainly be desirable to know something more about possible changes of the position of the diastolic length on the volume-pressure (or length-tension) diagram for the heart muscle fibers. If the drug being tested causes a shift in this curve there is a chance for recorded change, increase or decrease of isometric systolic tension which might have been seen at another diastolic length without the treatment. While this indicates a change in performance at given diastolic length it does not necessarily demonstrate a change in the ability of the heart muscle to perform.

Thus, the technic described has proved itself a usable means for demonstrating changes in the performance of heart muscle. The exact meaning of some of these changes is certainly not entirely clear in the light of other available information. Three specific examples might be cited.

(1) Potassium chloride has been classically considered to cause increase of diastolic and perhaps of systolic size and weakening of the beat. Nevertheless the experiments reported by Drs. Gazes and Walton have shown increased isometric systolic tension.

(2) A vasodilator drug such as amyl nitrite usually shows little or no true myocardial effect. These experiments have shown increased isometric systolic tension. Is this due to a direct effect on the myocardium or to a coronary vasodilator action?

(3) Finally with regard to the digitalis-like drugs, there is still no complete agreement as to the effects on the myocardium of the cardiac glucosides and even less agreement as to their fundamental manner of action. Nevertheless there seems to be accumulating evidence for the improvement of hypodynamic or dilated heart muscle at least under conditions of a highly artificial phosphate buffer system. These experiments, especially those with strain-gage recording from chronic, closed-chest preparations seem to indicate improvement in isometric systolic tension of the *in situ*, blood supplied heart, presumably in something approaching normal conditions.

If time permitted it would be desirable to ask for a discussion of such points as these. Lacking such time, one can but express appreciation of a technic painstakingly applied to a variety of conditions and yielding results which may point to a direct application in human cardiac therapy.

Dr. Gazes (closing).—Dr. Gilson has asked a highly pertinent question regarding heart size changes and their influence on contractile force. These have been studied in considerable detail and it has been demonstrated in some of our previous publications that size changes in the muscle segment can be reliably measured and due allowance made for these changes. With most drug changes in which we have been interested, we feel that size changes in the muscle segment parallel those in the whole heart. With most of these drugs, size changes in the muscle segment have been shown to be minimal and their influence is quantitatively small in comparison with the large changes produced by the direct action of the drugs on the myocardium. At the same time we recognize that, under some conditions, changes in length of the muscle segment, which we can measure, do not parallel changes in total heart size, which latter we have not measured with real precision. Size changes in the muscle segment and those in the whole heart certainly do not occur in parallel under such conditions as ligature of the right coronary artery and severe pulmonary stenosis, mechanically produced. These are relatively fantastic distortions of the circulatory system and the type of artefacts they introduce are not seriously involved in the measurements with which we have been most occupied.

Dr. Gregg has brought up the paradoxical observations following pulmonary artery stenosis which have been described in our previous reports. Normally, an increase in length of the muscle should have been expected, whereas, we frequently observed a decrease in size. We believe these latter results were largely due to decreased flow volume with resulting artefacts due to decrease in size of the left ventricle. Dr. Gregg has also made another very relevant comment to the effect that it would be desirable to place several myocardiographs in various locations on the heart surface in order to test the representative character of results obtained using the one selected area. In a limited way this has been done and the results so far have been in parallel. Dr. Gregg has suggested that these measurements are relatively insensitive since they show only limited changes due to various extra cardiac influences. Our interpretation differs to the extent that we consider the measurement is reasonably sensitive but that these extra cardiac influences are not large in comparison with the marked effects of these drugs directly on the heart muscle mass. At the same time, it is recognized that extra cardiac influences can be relatively more important in the clinical patient and that some of the drug-produced changes of our studies can be considered extreme. We offer, however, the view that these drug effects are sufficiently close to clinical conditions to provide some relevant information on these practical problems.

Dr. Gilson and Dr. Gregg have discussed these points from a background of wide experience in this field and I am particularly obliged for the attention they have given this report.

TREATMENT OF CORONARY ARTERY DISEASE*

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INTRODUCTION

The treatment of any disease is most successful when the cause can be removed. Even though this objective cannot be reached in patients with coronary disease, much can be done for them, and these therapeutic measures will be considered in this communication.

The treatment of coronary disease depends on whether the presenting clinical picture is: (1) that of recurrent pain of short duration without myocardial necrosis, or (2) that of more prolonged pain with necrosis (myocardial infarction).

TREATMENT OF ANGINA PECTORIS

The psychologic management of any type of heart disease is of utmost importance. The patient usually knows only what he hears from his lay friends and what he reads in the newspapers. He, therefore, is very likely to have a distorted viewpoint because his familiarity with heart disease is largely confined to fatal instances. He does not know that many patients, including even those with serious heart disease, survive for years or even decades. Much anxiety can be overcome by careful explanation of the significance or often the insignificance of the findings. The importance of tact, sympathy and understanding for the patient with coronary artery disease cannot be over-emphasized.

Activity.—There is no evidence that physical activity below the threshold of pain production has any harmful effects on the patient with angina pectoris. There is some evidence that it may even be beneficial, in that it tends to increase collateral coronary circulation. A short, slow walk once or twice a day, after taking a nitroglycerin tablet, often seems to produce gradual improvement. The length of the walk should be increased slowly, as exercise tolerance increases. There is no reason why such a patient should not hunt or fish if these activities do not produce pain. In many cases he is able to do this often without experiencing any discomfort, whereas a tense business conference quickly induces a seizure. Furthermore, there is a psychologic advantage in the exercise, as it tends to bring back the patient's confidence in himself.

The physician need not offer precise directions concerning physical exercise because one cannot predict the patient's tolerance in different situations. The best method is to tell the patient not to do the things which cause him to have pain. Other than this, he may do anything he likes. He has probably learned by experience what does or does not give him pain.

It has been well demonstrated that emotional stress is likely to be more harmful than mild physical exertion. The stress on the circulation with exercise endures only for the short period that the exercise is continued. On the other hand, the stress of mental activity continues over a much longer period of time. The overall stress then is often greatest with mental activity. Here again, the doctor is hard put to dictate the mental activities of the patient and it becomes necessary to urge him to avoid those situations which induce emotional tension.

A one-hour period of complete rest after the noon meal is usually desirable. Short vacations of a week or ten days, three or four times a year are usually more beneficial than one extended vacation.

Diet.—Reduction in total calories is essential in obese patients. Opinions vary as to whether slight weight reduction is desirable in subjects who are not obese.

Although the importance of hypercholesterolemia in the genesis of arteriosclerosis is beyond question there is still controversy concerning the relationship between cholesterol intake and the level of blood cholesterol. The accumulating evidence would seem to suggest that in certain individuals, high intake predisposes to atheroma. Pending further knowledge a diet low in cholesterol would appear to be indicated in all persons with coronary disease and especially in subjects with hypercholesterolemia.

Drugs.—Anginal attacks are best prevented by avoiding precipitating factors, but in addition, patients should be advised to use nitroglycerin. It was formerly believed that the action of this

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drug was of very short duration, but recent investigations have shown that the coronary dilator action usually lasts for two to three hours. Patients should be instructed to use this drug under several different circumstances.

(1) *For Relief of Pain.*—The patient should, of course, take nitroglycerin during a seizure. Treatment of an individual attack consists of having the patient stand or sit still and take a tablet under the tongue. The sitting or standing posture is usually preferable to the recumbent posture except in those individuals who develop marked faintness after taking the drug.

(2) *To Prevent Pain.*—Nitroglycerin should be used prophylactically in order to prevent attacks when situations arise that are likely to lead to seizures. Common examples are: shaving or dressing in the morning, attending a business conference, delivering a speech before a jury, preaching a sermon, or the act of sexual intercourse.

(3) *To Promote Collateral Circulation.*—The use of nitroglycerin for this purpose is not widely practiced but appears logical. Many patients appear to improve when they take a short walk twice daily, preceded by a nitroglycerin tablet. The distance may gradually be lengthened as the patient's exercise tolerance increases. The purpose of this procedure is to attempt to dilate collateral vessels by the simultaneous combined effect of exercise and nitroglycerin. Whenever a patient has a tendency toward postprandial pain nitroglycerin should be taken after meals and there may perhaps be an advantage in using it routinely at this time in all patients in an attempt to promote collateral circulation. This would seem actually to be treating the disease, or at least to be very close to it.

Other Drugs.—When compared to nitroglycerin, other drugs seem to have little place in the treatment of angina. Amyl nitrate acts more quickly but since it is used by inhalation the dose cannot be readily controlled. Papaverine and the various derivatives of theobromine and of theophylline have been extensively used, but improvement is rarely striking. Khellin appears to have a definitely beneficial effect in many patients but often induces nausea and there is no evidence that it has advantages over the frequent administration of nitroglycerin. Interruption of the upper four dorsal nerve roots bilaterally by operation or by injection of alcohol into the corresponding sympathetic ganglia will abolish the pain, but is only rarely necessary. These procedures should be limited to patients with severe and more or less intractable pain. When nitroglycerin is administered at sufficiently frequent intervals the number of patients requiring interruption of nerve pathways is exceedingly small.

Treatment of Myocardial Infarction.—In the acute stage complete rest, both physical and mental, is mandatory. Of first importance also is the relief of pain. This is best obtained by the administration of opiates as often as may be necessary for the purpose. If there is any appreciable degree of circulatory collapse, morphine should be given intravenously in doses of 10 to 15 mg. (1/6 to 1/4 grain). If administered subcutaneously it may not be readily absorbed.

It is only in the last few years that the importance of oxygen has been fully realized. A certain number of patients will experience marked diminution of pain from oxygen alone. If there are rales at the lung bases, or if cyanosis is present, oxygen is urgently needed. Even in the absence of these obvious indications, oxygen may be beneficial, although the mechanism of its action is not entirely clear. If cardiac output remains unchanged the tissue oxygen tension will be slightly elevated. If tissue oxygen tension remains constant cardiac output (and cardiac work) will be reduced. It is as yet uncertain which mechanism is involved in the improvement produced by oxygen in patients who lack evidence of arterial anoxia. This problem merits investigation.

There is some evidence that reflex coronary spasm exists for the first few days after infarction. Atropine in doses of 0.3 to 0.4 mg. subcutaneously has therefore been advocated. The value of this procedure is uncertain at present. Papaverine in 0.1 to 0.2 gram doses subcutaneously, every four to six hours, may be given for the first several days of the illness for its possible dilating effects on the coronary arteries, and its beneficial property of preventing ectopic rhythms.

An infarct consists of two distinct zones, a central area of necrosis (absolute ischemia), and a peripheral zone of relative ischemia. Although the central zone cannot be affected by vasodilator drugs, there is much evidence that the zone of relative ischemia can be affected. Nitroglycerin is a potent coronary dilator, and its duration of action is longer than has been generally thought.

In certain patients with myocardial infarction, favorable effects on the electrocardiogram may persist for as long as three hours following the administration of as little as 0.2 to 0.3 mg. (1/300 to 1/200) grain). Proof of the value of the drug in causing diminished size by dilating collateral channels is lacking. Pending further evidence, it seems wise to use it in all patients who are not in a state of circulatory collapse. When nitroglycerin is employed in this fashion, it should be administered at intervals of three to four hours, in doses less than those which produce headache or acute discomfort. Such management should be continued for several weeks, and the drug can then be gradually withdrawn. Sudden withdrawal may precipitate anginal attacks.

The available evidence seems to substantiate the fact that anticoagulants are a valuable part of the treatment of myocardial infarction from the very beginning. The purposes are to prevent phlebothrombosis and thereby reduce the likelihood of pulmonary embolism, to prevent the spread of thrombi in the coronary arteries, and to prevent mural thrombosis on the endocardium covering the infarcted area. Most investigators agree that dicumarol should be employed routinely when there is adequate laboratory control, and when there are no important contraindications such as disease of the liver or kidney, or bleeding tendencies. Some use heparin, even without laboratory control, as a result of the work that has been done by the Swedes. They advocate heparin in doses of 50 mg. every four to six hours.

Food during the initial 24 hours is best restricted to fruit juice. Water may be given in amounts of 1,000 to 1,500 ml. per day, or more if there be profuse sweating.

Bowel movements may be neglected during the initial few days. After this period it is wise to begin administration of a nightly dose of mineral oil to soften the stool, as straining is dangerous.

After the initial phase of the illness has passed and the patient is improving, the therapeutic regimen changes somewhat. The diet should be low in calories (1,000, or under, more especially if the patient is obese), and it should be low in cholesterol, for reasons previously mentioned. In addition, the available evidence suggests that the diet should be rich in ascorbic acid, as this may be of help in healing the infarct. The advocated dose is approximately 300 mg. per day, orally, for about three weeks.

Mineral oil should be continued daily while the patient is in the hospital, to alleviate the necessity of straining at the stool.

A high percentage of patients who are progressing favorably from a physical standpoint, are anxious and restless and, therefore, suffer from mental stress. They should be given a mild sedative such as 50 mg. phenobarbital three times a day and at bed time.

Along with anticoagulant therapy, patients in bed should have at first massage and passive movements of the extremities, and later some active movements to help prevent phlebothrombosis.

TREATMENT OF THE COMPLICATIONS OF MYOCARDIAL INFARCTION

Forward Failure.—Some degree of forward heart failure (shock) is present in most instances of myocardial infarction. Too often it is a very striking feature. Because of the dangers of enhancing the symptoms of backward (congestive) heart failure or actually initiating the symptoms, physicians have been very reluctant to give intravenous blood and plasma. The evidence in the past two years, however, has been sufficient to show that such infusion in the presence of critical forward failure may be the proper treatment. Infusions should be given slowly (1 to 2 ml. per minute) and constant vigilance is required in order to detect the first symptoms of backward failure, so that if this occurs the infusion may be interrupted at once.

Vasoconstrictor drugs are of dubious value, and may be harmful.

Backward Failure.—Congestive failure may be a striking component of myocardial infarction. There has long been doubt as to whether or not digitalis should be given, because of the fear of producing ventricular tachycardia. If congestive heart failure is severe or progressive, digitalis should be given. In patients with cardiac infarction lanatosid C is preferable to digitoxin because of its short duration of action in case toxic effects occur. Quinidine should be given when premature beats or more serious arrhythmias develop.

Rigid restriction of sodium should be maintained in the presence of congestive failure. Dyspnea is often benefited by aminophylline, 7½ grains (0.5 gram) given rectally at 6-hour

intervals. If dyspnea and venous distension are present to a striking degree, cautious venesection may be advisable, provided this procedure is not attended by a sharp decline in blood pressure.

Oxygen therapy is indicated when either backward or forward failure exists.

Arrhythmias.—The other serious complications associated with myocardial infarction are the arrhythmias. Any arrhythmia may occur but the most common are premature beats, ventricular tachycardia, and ventricular fibrillation. These lead one into the other, and, therefore, should be treated in the beginning when the premature beats first appear. Quinidine is ordinarily the drug of choice. One usually employs an initial dose of 0.2 gram and increases the dose every three hours until the arrhythmia is controlled.

Bradycardias are less common than tachycardias, but any degree of heart block may develop. In patients with complete heart block, with or without Adams-Stokes syncope, the treatment of choice is epinephrine every two hours in doses of 0.5 to 1 ml. of 1:1000 solution, subcutaneously. With the milder forms of block, ephedrine may be employed orally.

Resumption of Activity.—This is one of the major problems in patients with myocardial infarction. All agree that the patient should remain at complete rest during the initial phase and should be in the most comfortable position. For a patient in shock, this usually means recumbency. On the other hand, a patient with dyspnea may prefer a sitting or semi-sitting position. The idea that the heart is more at rest in the recumbent position is incorrect. Cardiac output is almost always greater in the recumbent position, and the blood pressure is usually almost the same when sitting as when lying flat. Therefore, the work of the heart is usually less in the semi-recumbent or sitting position. Sitting favors the development of edema of the legs, but recumbency favors pulmonary edema, which is far more dangerous.

The previous idea as to the desirability of prolonged rigid bed rest is being abandoned. The present tendency is to have the patient remain in bed (except for bowel movements) for a two to three-week period, and then to be out of bed in a chair and to walk slowly around the room after the third or fourth week. It is the concensus that an older person should be restricted to complete bed rest for a shorter period of time than the younger person, because of the greater likelihood of development of phlebothrombosis and infection in the former.

During the convalescent period, stair climbing should be avoided and the patient allowed gradually increasing activity, in terms of walking in the house. The duration of this period will vary according to the circumstances. The available evidence, which is quite incomplete, would suggest that there is every advantage in prolonged restriction of activity, but little to be gained by prolonged rigid rest in bed.

SUMMARY

In most respects the therapeutic measures which have been mentioned are those which are widely accepted and are generally utilized. There are wide differences of opinion concerning the degree and duration of activity restriction. Here, the basic principles seem to be that in chronic coronary disease (whether anginal or post-infarctional), mild physical activity should be encouraged so long as the patient remains well below the symptomatic threshold of pain and dyspnea. The basic principles, as regards activity in the acute and immediate post-infarctional period, would seem to be the utilization of that posture in which the patient is most comfortable, and realization that the advantages of prolonged rigid bed rest are likely to be offset by even greater disadvantages.

It is suggested that two procedures may be of value in reducing the size of the infarct by increasing the oxygen supplied to that zone of tissue which is intermediate between the area of initial necrosis and the sounder healthy myocardial tissue. These two measures are: (1) the use of oxygen; and (2) the frequent administration of subsymptomatic doses of nitroglycerine. Although conclusive evidence concerning the value of these procedures is not yet available, theoretical considerations plus experience with the relatively small number of cases appear to justify such management, pending more exact information.

DISCUSSION (*Abstract*)

Dr. E. Sterling Nichol, of Miami, Florida, was requested by Dr. Harrison to answer the questions on his paper, Dr. Harrison having to leave the session for his plane before the time for the question and answer period.

Question.—How long do you believe in feeding the patient in acute myocardial infarction?

Dr. Nichol.—I think it is a mistake to let a patient perform a Valsalva experiment on the bedpan daily, and then insist that he also be fed by the nurse. I believe that very few patients need to be fed unless they are in shock, except in the first twenty-four to forty-eight hours. I am sure Dr. Harrison would agree with me, as he has been a strong advocate as you can tell from his talk this morning, on less restriction of activity.

Question.—Should the patient who developed a ventricular aneurysm as a result of myocardial infarction be restricted more in physical exertion than the one with no complications?

Dr. Nichol.—Certainly, if a patient has a large enough area of necrosis and damage to form a well defined ventricular aneurysm, the very nature of his acute illness will necessitate more restriction; he is much more likely to be the patient who went into shock with his attack or who developed signs of failure during the first two weeks of his attack. However, it is fairly well agreed by most observers that when an aneurysm has been well formed and scar tissue has been laid down, there is no more reason to restrict such a patient in his physical activities than in the case of a patient without a ventricular aneurysm.

Question.—What do you think of the use of papaverine in acute coronary thrombosis with infarction?

Dr. Nichol.—Dr. Katz in Chicago made this very popular some years ago, but I do not believe he is as keen about it as he used to be, and the physiologic effect of papaverine is so short-lived that I do not think it has quite the virtue that it was once thought to have.

Question.—If nitroglycerin proves effective, is there any objection to the patient's using the drug several times a day?

Dr. Nichol.—Dr. Harrison pointed out very clearly that he was in favor of using it several times a day for pain, and for the prevention of pain. I wish he had added the term "pressure," in addition to pain. Many patients will not use nitroglycerin unless they have pain, and will not use it for pressure. Pressure is just as much an indication for the use of nitroglycerin as pain. I believe Dr. Harrison's comment on using it prophylactically and using it in an attempt actually to promote the collateral circulation in the myocardium by using it several times a day is rational.

Question.—What anticoagulant do you use? Do you advise the use of liquors? If so, at what time?

Dr. Nichol.—Of course the anticoagulant in common use is dicumarol, although compound 63 of Link and his co-workers apparently is going to be more easily controlled than dicumarol, and probably will be a safer anticoagulant. Tromexan,® which is at present on the market, is also a good anticoagulant; it works faster than dicumarol, and the effect is obtained in twenty-four hours. The disadvantage is that the effect is also dissipated faster, so that larger doses of the drug must be used, and in my own hands it has been no easier to maintain a stable prothrombin time with tromexan® than with dicumarol. However, there is some evidence that the toxic properties of tromexan® may be less than in the case of dicumarol. I believe compound 63 which is not yet clinically available, will be superior to any of the other oral anticoagulants so far tried. The phenylindandione compounds also have some virtues over dicumarol, but not for long term therapy because they are more rapidly eliminated just as tromexan® is.

Question.—What is your opinion as to the value of alcohol in management of coronary heart disease?

Dr. Nichol.—A number of you may have seen the work published recently which attempted to show that the reason the man with angina had less pain after using alcohol was that his pain threshold was lowered and not that it acted as a coronary dilator. There probably is quite a little to that work, yet I am inclined to believe that that is not the whole story with alcohol, and in my own advice to patients, I go along with Dr. William Stroud, and you all know his point of view, which is whiskey *ad lib*.

Question.—In myocardial infarction, how do you give nitroglycerine, by what route, and how long is it continued?

Dr. Nichol.—Dr. Harrison advised giving nitroglycerin every few hours, unless the blood pressure was quite low. I am quite sure he would agree if he were here that there are patients, even with a high blood pressure, who develop a shock-like reaction with an ordinary dose of nitroglycerin. It is commonly advised in textbooks on heart disease not to use nitroglycerin during acute myocardial infarction, yet that is not an iron-clad rule. It is not desirable to lower the pressure too much with nitroglycerin during the acute episode, and one sometimes may do more harm than good; but I have seen numerous cases given morphine for mild pain when nitroglycerin might have relieved the pain with less complication than that developing from the use of the opiate. I believe that small doses of nitroglycerin in a patient without hypotension or shock are ordinarily acceptable in the acute episode, bearing in mind that if the patient reacts abnormally to nitroglycerin the dose should not be repeated. Nitroglycerin is best given sublingually.

Question.—Would you comment upon recent reports in the literature of profound fall in blood pressure after ordinary doses of nitroglycerin and resulting in syncope or death?

Dr. Nichol.—That is the same question. Such episodes do occur occasionally. One of the early discussions of this subject that I recall was by Dr. Walter Priest ten years ago in "Modern Concepts of Cardiovascular Disease." He showed the disadvantage of a sudden drop in blood pressure with production of coronary insufficiency following the use of nitroglycerin.

Question.—What is your opinion of placing foreign material in the pericardium in order to produce adhesions and thus collateral circulation in chronic coronary disease?

Dr. Nichol.—I do not know what Dr. Harrison's point of view on that would be. Drs. Thompson and Raisbeck in New York City have treated some patients in this fashion. I have seen only one of their cases, and

it appeared to be a good result. I believe Dr. Beck continues to advocate his method for revascularization of the heart.

Question.—Is the use of intensive anticoagulant therapy in acute coronary infarction definitely justified at present? If so, how long should the anticoagulant therapy be continued?

Dr. Nichol.—I believe the work of the American Heart Association Committee on Anticoagulants has fairly definitely shown the advantage of anticoagulants in acute coronary thrombosis with myocardial infarction. The death rate in the reported group compared to the controls was 16 per cent against about 23 per cent in the controls. The incidence of thrombo-embolism was likewise greatly reduced. Many of these cases were ward cases; in private practice the figures are even more encouraging. In my own group of approximately two hundred patients with acute coronary thrombosis, the death rate was about 14 per cent, and only 3 per cent showed evidence of thrombo-embolism, which I think is very encouraging. How long should it be continued? I should not be answering that question, because I believe in the long term use of anticoagulants, once a patient has developed acute coronary disease, but I am possibly alone in that viewpoint.

THE OFFICE DIAGNOSIS AND TREATMENT OF FUNCTIONAL UTERINE BLEEDING*

By LEE F. TURLINGTON, M.D.
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Functional uterine bleeding may be defined as an abnormal bleeding which occurs because of a disturbance of physiologic mechanisms, rather than an existence of organic disease, local pathologic conditions, or gestational phenomena. The chairman of your section has chosen one to present this subject who is primarily a clinician. Your speaker has practiced gynecology long enough to observe the treatment of functional uterine bleeding go through many changes; all the way from watchful waiting and then if necessary, curettage, to the present methods. Even with the modern methods, the diagnosis and treatment of functional uterine bleeding are not always easy.

Diagnosis of a functional disturbance is founded upon the exclusion of other causes. Hormone dysfunction is the chief cause, but nutritional or vitamin deficiencies and nervous and psychogenic factors play important contributory roles.

The bleeding may be menorrhagic or metrorrhagic in character, moderate or extremely profuse. The episodes may occur cyclically or acyclically, usually the latter.

Functional uterine bleeding may occur at any age between puberty and the well established menopause. It is, however, most frequently encountered during the beginning and the decline of the menstrual function.

Speaking generally, either the common ovulatory or the less common anovulatory cycle may undergo abberation, with the production of functional uterine bleeding. Most functional excesses of uterine bleeding occur from interval or estrogenic endometrium; however, bleeding may come from an endometrium that is poorly proliferated or atrophic, from normally proliferated, or excessively proliferated hyperplastic endometrium. Poorly or irregularly differentiated progestational endometria may give rise also to excessive flowing which may be associated with irregular shedding of the endometrium. When excessive flowing occurs from a full blown normally differentiated progestational endometrium, the explanation is usually an organic one rather than a functional one.

Not infrequently a case of functional uterine bleeding is seen which has been caused by the administration of estrogen for the alleviation of symptoms occurring in the menopause. All too often, the treatment given has been that suggested by an overenthusiastic drug-house detail man who has neither studied medicine nor examined the patient. Very many estrogenic preparations are offered by the drug houses and each physician should select for his use one or two preparations that he can really know, and prescribe none of the others. A patient for whom estrogen had been prescribed in small doses for an atrophic vaginitis went away for a summer vacation and when the vaginitis recurred, she took what she thought had been the dose prescribed, but it was dispensed in rat units instead of international units. When she started vaginal bleeding at age sixty-seven, she was naturally alarmed.

The menopausal patient who has bleeding from estrogen administration will be found to have an active vaginal mucosa, one that appears as it should during the childbearing age, rather than the atrophic thin membrane of the postmenopause. If a patient has vaginal bleeding after the well established menopause, who has

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had no estrogen therapy and can be shown to have an active vaginal mucosa, almost certainly she is a victim of one of the estrogen forming tumors. This might also be called functional uterine bleeding.

In the investigation of excesses of uterine bleeding, a general physical examination and a careful gynecologic study are necessary. A speculum examination of the cervix and a bimanual pelvic examination are essential. In virgins, the cervix can easily be inspected without tearing the hymeneal membrane, through a number ten or twelve Kelly cystoscope, with the patient in the knee-chest posture. If the introitus is small, a recto-abdominal bimanual examination can be done and if the patient is unable to relax enough for an examination that can rule out any pathologic pelvic condition, a sedative or even a general anesthetic should be administered. Regardless of the age of the patient, vaginal cytologic studies should be undertaken in every case with abnormal bleeding. However, this test should not replace diagnostic curettage when that is indicated. In our office, routine vaginal cell examinations are done on all patients over thirty years of age, and we have had negative reports on 40 per cent of our cases of endometrial carcinomas and 12.5 per cent of cervical carcinomas, proven by biopsy and curettage.

MANAGEMENT

The management of functional uterine bleeding depends not only upon the severity of the disorder, but upon the age of the patient as well. It is relatively common to observe moderate menorrhagia in young girls during the initial anovulatory cycles, often associated with abnormally long intervals. Such patients, after a year, more or less, may begin to ovulate at which time menstruation may become normal without treatment.

It is important to remember, as was said earlier, that nutritional or vitamin deficiencies and nervous and psychogenic factors may play an important contributory role. Measures must be taken to correct these factors when they exist. Medication with hematinics should be given when anemia is present.

When functional bleeding becomes a problem in the very early stages of menstrual life, curettage is not usually imperative for diagnostic purposes. If a pelvic examination shows normal organs, the functional nature of the bleeding can ordinarily be safely assumed. Curettage is often indicated for therapeutic purposes when a young girl has become very anemic from loss of blood, since it is the quickest way to stop bleeding, and not infrequently menstruation will occur normally after curettage. We are justified in delaying further treatment after curettage until we can determine whether or not the abnormal bleeding is going to continue.

The time of vaginal bleeding in relation to the normal period is important. If the bleeding is just premenstrual or postmenstrual and lasts for three or four days, and has occurred for only two or three months, one need do nothing about it because it is quite possible that the ovaries may correct the trouble without outside help. If this should persist, then hormone therapy should be instituted. If a moderately excessive vaginal bleeding is noted on one or two occasions, at a normal time, it is wise to refrain from hormone therapy until it is found that ordinary hygienic measures such as attention to exercise and domestic relations have failed to improve the situation. Most physicians are prone to prescribe hormones too quickly.

When bleeding occurs between the menstrual periods that cannot with fair certainty be ascribed to ovulation, particularly if the patient be past thirty years of age, it should be considered with much more concern. If careful and thorough examination show the pelvic organs to be grossly normal, and the bleeding of intra-uterine origin, there is a clear indication for diagnostic curettage. If this yields only a normal endometrium in any proliferative state, or a benign hyperplasia, or a definitely secretory one, a diagnosis of functional uterine bleeding is justified. If curettage in a woman at or near the menopause shows the condition to be benign, it is felt that a trial of hormone therapy is indicated. If bleeding is not controlled after adequate trial by hormone therapy, the writer prefers to do a subtotal fundectomy in women under thirty-seven or -eight years of age, or a complete hysterectomy in those over that age rather than resort to radiation castration.

The possibility of hypothyroidism must be considered in every case of functional uterine bleeding. The basal metabolic rate should be determined on all such patients and thyroid therapy tried on all cases with low normal or subnormal rates. In an occasional case, normal menstrual cycles are re-established by this remedy alone.

Cyclic estrogen and progesterone therapy, as described by Hamblen,[1,2] has seemed most logical. This has been most widely used by us, and it has given very good results in a large number of cases. Beginning on the fifth day of the menstrual cycle, estrogen sulfate or premarin® (mg. 1.25) is given three times a day for twenty days. During the last ten days of this treatment, 10 mg. of anhydrohydroxyprogesterone is given three times a day. Usually within one to five days after the treatment is ended, the patient will start menstruating. On the fifth day after the start of the period, a second course of the estrogen-progesterone is started. Usually three cycles of the above regime are followed before therapy is stopped. In a few instances when the oral administration of estrogen and progesterone, as above indicated, has not given the desired results, we have found that intramuscular injections of 10 mg. progesterone on each of the last four days of the twenty day therapy cycle instead of oral administration of progesterone in the last ten days, has produced a more normal menstruation.

According to Hamblen, this balanced hormone treatment produced restoration of normal ovarian function in a majority of women with excesses of uterine bleeding. This is accomplished in the first place by putting the ovaries at rest, thereby allowing overstimulated granulosal and thecal elements to regress. It brings the endometrium under essentially normal biphasic cycles of estrogen and progesterone stimulation, thereby restoring normal endometrial growth and regression. The pituitary is subjected to normal conditioning mechanisms which throttle follicle stimulation at the proper stage and permit release of luteinizing gonadotropin in effective amounts at the proper time of the cycle instead of permitting it to be continuously released in subthreshold amounts, and the steroid metabolism is readjusted and becomes normal. When the treatment is discontinued, the rested ovaries usually establish their normal reciprocities with the pituitary.

Greenblatt[3] combines the use of estrogens, progesterone, and androgen in the treatment of functional uterine bleeding. With the following regimes, he reports that excellent results may be expected in 95 per cent or more. Ten thousand rat units of estradiol benzoate (or the equivalent), 25 mg. of progesterone and 25 mg. of testosterone propionate are given in combination by intramuscular injections for three to five consecutive days. If bleeding stops promptly after the first injection, the dosage may be cut in half on the second day and reduced to one-fourth of that dose on the third, fourth and fifth days. Bleeding usually stops within six to twenty-four hours, although some spotting may continue for a few days. One or two days after cessation of therapy, withdrawal bleeding takes place and this will simulate a normal menstruation and will last about four to six days. The first day or two of this withdrawal bleeding may appear excessive, but bleeding usually subsides gradually from then on. It is important to warn the patient to expect this withdrawal bleeding; otherwise she will believe that a recurrence of the hemorrhage has taken place. He points out that progesterone is a desquamative hormone. It causes the desquamation of vaginal epithelium as well as the shedding of endometrium and its administration helps perform a medical curettage.

About twenty days later, a course of 150 mg. of anhydrohydroxyprogesterone (10 mg. three times a day for five days) is given orally to induce withdrawal bleeding. This therapy is carried on for five days each month for three months or longer, until it is felt that the patient has resumed normal cyclic bleeding.

There is no doubt that large doses of estrogen will stop excessive uterine bleeding of functional origin. We must thank Karl Karnaky,[4] of Houston, for demonstrating that tremendous doses of estrogen can be used with impunity. He uses synthetic estrogen exclusively for the treatment of functional uterine bleeding and makes the statement that he has never found a use for progesterone.

Others, among them some of the best clinicians, never use estrogens in the treatment of functional uterine bleeding, unless the endometrium is atrophic. Jones and TeLinde[5] recommend oral administration of 30 mg. of progesterone daily for seven days, to be repeated twenty-one days later. They give three or more cycles of this therapy.

No one is more averse to the treatment of patients according to the suggestions of drug salesmen than is the writer; however, once, before the most modern hormone therapy was devised, when desperate on account of poor results obtained in treatment of a young girl with hormone therapy, he did listen to a detail man. This man, a very dependable individual, said that a

doctor of national reputation and known to us all, had obtained excellent results from the use of "Armour's antimenorrhagic factor," recovered from liver. It is stated that this "factor" is a liver steroid and that is all that can be ascertained about it. The director of the Armour Medical Laboratories in a recent personal communication, had this to say:

"It is difficult to ascribe the action of the substance to any specific effect on metabolic or endocrine systems."

It was given, three or four capsules every four hours while awake, until bleeding abated and then one capsule three times a day for an indefinite period. We were pleased with the results obtained in the treatment of this individual and have used it successfully in several other cases.

SUMMARY

It has been pointed out that the diagnosis of functional uterine bleeding depends on the ruling out of any organic disease that could cause bleeding. Emphasis has been placed on the necessity of considering cancer and eliminating it as the cause, particularly in cases of irregular spotting between menses and in women thirty-five years of age or older. Three methods of office treatment which have been used to advantage have been outlined.

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THE PROBLEMS OF THE PROSTATE GLAND*

By GRAYSON CARROLL, M.D.†
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There are many problems of the prostate gland.

The gland is composed of five lobes: the anterior, which is usually rudimentary, the lateral lobes, the median lobe, and the posterior lobe. It lies completely external to the bladder. The urethra tunnels through it. The gland lies on the rectum separated only by the rectovesical fascia (Denonvilliers). Fortunately it is situated close enough to the anus to permit easy palpation with the finger.

The life span of the prostate may be divided into three periods:

(1) That of quiescence, from birth to puberty.

(2) That of activity, from puberty to the fourth or fifth decade.

(3) That of recession, which begins about the fifth decade.

According to Dr. Robert Moore:[1]

"In a person over 60 years of age, it is possible to estimate the age of the man by gross and microscopic examination of the prostate."

The function of the gland is apparently limited. The muscular contraction at the time of orgasm assists in expelling the semen. It also adds a secretion which causes the ejaculate to congeal into a bolus. The gland secretes from 2 to 10 cc. of fluid daily through its 18 to 20 ducts which open into the urethra. This secretion is continuous, and is washed out by the urine. Sexual continence does not cause it to be stored, nor is sexual exercise necessary for its elaboration. The secretion contains the common chemicals of the body such as sodium, potassium, calcium, protein, cholesterol, glucose, alkaline and acid phosphatase.

This latter chemical may play some distinct role as yet unknown. It is found in greater amounts in the prostate than in any other organ, and the metastatic lesions of the carcinomatous prostate also contain large amounts. The normal amount excreted is 600 mg. daily, in the urine. Where carcinoma has broken through the capsule of the prostate, an elevated acid phosphatase is found in the blood, obviously too late for radical removal of the cancer.

Prostatic secretion is not essential for fertilization. Spermatozoa obtained by aspiration from the epididymis have brought about pregnancy when injected into the vagina.

The gland has no demonstrable internal secretion. Its removal produces no withdrawal symptoms and when an extract or portion of the gland is injected, there is no additive effect. Therefore, it is not surprising that a man does not lose his libido or erectile power when it is

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removed. The normal growth and secretion of the prostate gland are influenced by the testicles and pituitary gland. When the testicles are removed the secretion subsides, but is again activated when testosterone is given. Endocrine therapy, estrogenic or androgenic, does not cause hyperplasia nor will it diminish or retard the growth. Estrogens produce a minor change of metaplasia of the ducts only. Abnormal growth and secretion cannot be produced, however.

So much for the physiology of the gland, which is helpful in the understanding of the clinical features. Three clinical problems will be discussed:

(1) Prostatitis
(2) Hyperplasia, and
(3) Carcinoma.

Prostatitis.—Infection of the prostate is quite common between puberty and 45 years of age. The symptoms are backache, itching, crawling sensation in the perineum, malaise, and sometimes urinary symptoms. Only a small percentage of cases are the result of venereal disease. Staphylococcus is the most common organism isolated. The diagnosis is made by microscopic examination of the secretion expressed from the urethra by rectal massage of the prostate. If the unstained specimen shows more than 10 pus cells per high power field, prostatitis exists. The diagnosis cannot be made by rectal palpation only. The treatment is gentle massage every 4 or 5 days.

Acute prostatitis is usually hematogenous and occurs suddenly with chills and fever. Localized pain may not be present and the condition may be recognized only when a tender, swollen prostate is palpated *per rectum*. This condition is often overlooked and treatment given for a cold or flu. The treatment is hot sitz baths and no massages. Penicillin and aureomycin may be given but are disappointing.

Benign Hyperplasia.—One of the real problems is this entity. It is now recognized by most investigators that the so-called hypertrophied prostate gland is neither an hypertrophy nor is it the enlargement of the prostate gland. As described previously, practically all prostate glands recede at about the fifth decade, as do most tissues as age progresses, but a strange phenomenon occurs in about 25 to 35 per cent of males at about this time.

A hyperplastic nodule begins to grow from the cells of the peri-urethral prostatic ducts, first as a fibrous growth, and later, by invagination, glandular tissue is produced. This tissue crowds out the already receding prostatic tissue and takes somewhat the form of the lateral and median lobe of the prostate. It is a true hyperplasia similar to myomata in the uterus. The cause of this overgrowth is unknown.

As was stated previously, neither estrogenic nor androgenic substances affect hyperplasia. This is comprehensible when it is realized that the condition is not an enlargement of the prostate gland. Also, massaging the hyperplasic neoplasm will neither prevent its growth nor arrest its progress.

The early detection of the condition is desirable, not so much to relieve the immediate symptoms, but to prevent the damage to the kidneys with its subsequent chain of effects, which ultimately become irreversible. Early detection may be made by noting any change in the urinary habits, particularly loss of force, in all male patients over 50 years of age. The prostatic area palpated rectally demonstrates some protrusion in that area. Then when the patient has urinated and the residual urine is collected by catheter, the diagnosis is sure. Surgical treatment is the only relief now available.

The hazard has been greatly reduced. The operative mortality is now less than 1 per cent. The stay in the hospital is from 5 days to 2 weeks. Rarely is a two-stage procedure necessary, and the day of wet dressings is about over. Four methods of removal are now available:

(1) Transurethral
(2) Retropubic
(3) Perineal, and
(4) Suprapubic.

These should be chosen in the light of the individual condition.

Carcinoma.—George Gilbert Smith[2] of Boston says:

> "Six pathologists have found that routine autopsy studies of the prostates of men over 50 years of age showed small latent foci of carcinoma in from 14 to 46 per cent."

Kahler[3] at the Mayo Clinic found malignancy in various lobes in the following proportion:

> "Six were in the anterior lobe, 46 in the lateral lobes, 44 in the posterior lobe, and 16 per cent of the cancers arose in the areas of nodular hyperplasia."

At the St. Louis City Hospital it stands second in frequency of occurrence of all types of cancers.

Early cancer gives no symptoms. The only opportunity to effect a permanent cure is before symptoms occur. The best way to detect early cancer of the prostate is by palpation of the gland *per rectum* with the examining finger. The hard irregular nodule palpated in the prostatic area deserves further investigation. Further investigation may be construed as requiring staining of the secretion massaged from the suspected gland by Papanicolaou's technic, the needle biopsy puncture and in some instances a careful prostatic resection of the nodular area aided by the finger in the rectum.

The study of the secretion has been somewhat stimulated by the report of Alvers, McDonald and Thompson of the Mayo Clinic that in a study of the secretion of 100 clinically benign prostates, 3 showed cancer cells and were proved to be malignant by examination of sections removed by transurethral resection. Likewise, 41 clinically malignant prostates were submitted to the cell diagnostic test; from 17 no secretion was obtained but of the 24 cases which did produce secretion, 20 gave a positive test.

Likewise, the acid phosphatase of the blood and roentgenogram of the pelvic bones and lumbar spine give additional help in diagnosis. None of these tests is formidable. They are practically painless and without hazard, which justifies their adoption practically as routine. The alertness on the part of the examining physician in detecting early cancer of the prostate is well justified since surgical removal is no longer a great hazard. In a high percentage of cases in which cancer is detected early and removed, the cancer is completely eradicated. Jewett,[4] of Johns Hopkins Hospital, says:

"Between the years 1938-1948, 17.8 per cent of cases of cancer of the prostate were subjected to total prostatectomies. . . . Probably 11 per cent will be the average in most clinics."

The operative mortality of radical prostatectomy may be stated as about 5 per cent. The operation of choice is the perineal or retropubic approach; the perineal probably is preferable since a biopsy and frozen section are more accessible. The palliative treatment of cancer of the prostate, to be used when the carcinoma has extended beyond the prostate, is now very beneficial. The urologist, Charles Huggins of Chicago University, was the first to discover the relationship of endocrine secretion to some forms of cancer. Treatment consists of administration of estrogenic substances in as large doses as the patient can tolerate. The accepted maintenance dose is between 5 and 10 mg. daily. The removal of the testicles is reserved by most urologists for the appearance of metastatic lesions or severe pain. It was thought that the estrogenic substances counterbalanced the androgenic substances. This is probably not altogether true since some cancers of the prostate are benefited by the administration of androgenic substances. This is one of the unsolved problems.

A few of the problems and generally accepted opinions concerning the prostate gland have been mentioned. As principles based on revealed knowledge are applied to the clinical problems of the prostate, these problems are becoming less formidable and further relief is forecast for these most prevalent maladies.

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DISCUSSION (*Abstract*)

Question.—What is the effect on hyperplasia of the prostate gland of (a) massage, (b) injections of theelin or testosterone?

Dr. Carroll.—Massage has no favorable effect. There may be some harmful effect. Testosterone or theelin does not arrest the growth of hyperplasia of the prostate. Metaplasia of the epithelial cells along the ducts is noted when theelin is given. There is some increase in tonicity of the muscles when testosterone is given, causing some improvement in the symptoms.

Question.—What pathologic lesions cause urinary retention other than a hyperplastic prostate?

Dr. Carroll.—At least 30 per cent of the obstructions at the bladder neck are the result of pathologic lesions other than hyperplasia. Contractures, congenital valves, tumors, and atonic bladder due to neurogenic causes all will produce residual urine in the bladder. The median bar or contracture is the most common. It is fibrous tissue formed at the bladder neck as a result of an infection of long standing. The same symptoms are created as in hyperplasia but no enlargement of the prostate is palpated *per rectum*. It is easily relieved by transurethral resection.

Congenital valves are found in children, causing marked dilatation of the ureters and kidney pelves above.

Question.—Describe the method of relieving an acute urinary retention.

Dr. Carroll.—Acute retention is most commonly due to an enlarged prostate gland, a stricture, or a contracture at the bladder neck. The method of relief of the acute retention depends on, first, the proper diagnosis of the cause.

The enlarged prostate can usually be palpated by rectum. The history is one of gradually increasing difficulty in urinating and no history of treatment for stricture in the earlier days. A curved instrument, either a Coudé catheter or a stilleted catheter with a marked curve when gently but firmly inserted down to the posterior urethra and then dropped down between the legs will usually cause the instrument to slide easily into the bladder by overcoming the obstructing median lobe. A No. 24 catheter can be used in this manner even better than a smaller one.

In the case of a stricture the problem is one of small caliber with pockets and corkscrew curves. This calls for a fine filiform, preferably corkscrew in type, or a very small catheter. It is not necessary to depress the instrument but many trials are necessary to avoid the pockets.

Question.—What is the danger of activating a carcinoma of the prostate by giving testosterone in the so-called male menopause?

Dr. Carroll.—The danger of activating the carcinoma of the prostate by testosterone has not been fully evaluated. It is thought by some that a quiescent carcinoma may be activated by testosterone. It is quite doubtful that it will create one. Dr. Charles Huggins of the Cleveland Clinic recently reported development of bilateral breast carcinoma while testosterone was being given. The enlargement of the breasts is usually cystic, however.

Question.—What is the effect of castration on the prostate gland?

Dr. Carroll.—Castration before puberty prevents hyperplasia of the gland in later life. Forty-four eunuchs who were castrated as a ritual did not develop prostatic enlargement. Castration after hyperplasia is present apparently has no effect on the growth although some isolated cases have been reported where reduction in size has taken place.

Question.—What is the best estrogenic substance to use in late cancer of the prostate, and what is the dosage?

Dr. Carroll.—Late cancer of the prostate with metastases has shown marked improvement on large doses of estrogenic substances. Ethinyl estradiol tablets 0.4 mg. each, 1 tablet 3 times a day, was formerly given, but with the desirable increased dosage, 12 tablets daily may be preferable. When the patient apparently does not tolerate small doses, marked increase of the doses equal to some 50 to 100 mg. of stilbestrol causes improvement and disappearance of such unsatisfactory symptoms as nausea, painful breasts and edema. A new product known as Tace,® an estrogenic substance, is proving to be quite satisfactory in our cases.

Question.—What is your operation of choice for complete radical removal of carcinoma of the prostate?

Dr. Carroll.—Radical removal of the prostate gland can be accomplished either by the retropubic or the perineal operation. We have used the retropubic approach with a large incision, which gives adequate exposure so that the complete removal of the gland with the seminal vesicles can be accomplished without great hazard. The perineal approach, however, makes it possible to remove a biopsy specimen from the posterior lobe and examine at the time of the operation to determine whether to proceed with the radical operation in the doubtful case. The majority of carcinomas of the prostate arise in the posterior lobe. For this reason, the perineal is the preferable approach.

TREATMENT OF INFANTILE BOWLEGS AND KNOCK KNEES*

WITH SPECIAL CONSIDERATION OF THE THERAPEUTIC USE OF LARGE DOSES OF ACTIVATED ERGOSTEROL

ANALYSIS OF 58 CASES

By HARRY D. MORRIS, M.D.
New Orleans, Louisiana

In spite of increased facilities for pediatric care, emphasis on the administration of vitamins for prevention of deficiency diseases, and improvement in type and method of administration of these products, infantile bowlegs and knock knees constitute a considerable portion of the cases encountered in the average clinic for the treatment of crippled children. In the clinic conducted by the Crippled Children's Division of the Louisiana State Board of Health, New Orleans district, during the past six years infantile bowlegs and knock knees represented approximately 7 per cent of the cases accepted on the program for treatment.

Most textbooks, even the most modern, consider skeletal rickets as the etiologic factor of both bowlegs and knock knees occurring in children between the ages of 9 months and 4 or 5 years. In fact, in Bradford's time,[1] knock knees occurring in the infantile age group was called *genu valgum rhachiticum*, to distinguish it from the form occurring at puberty, known as *genu valgum staticum* or *adolescentium*. With the exception of those cases due to primary or secondary disturbances of epiphyseal growth, such as achondroplasia, dyschondroplasia or tibia vara,

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rickets formerly was considered to be the sole etiologic factor in this age group.

Later observations, however, have altered these opinions considerably. Blount[2] called attention to physiologic bowlegs, which he believes is a growth variant, since the newborn normally has considerable bowing of the lower extremities with flexion deformity of the hips. During the first year bowing of the femurs disappears, and bowing between the knee and ankle with compensatory valgus deformity above the knee appears. During the second year the bowing below the knee disappears and the child has knock knees, which persists until he is 4 to 6 years of age. Caldwell[3] considered overweight as a major cause of abnormal degrees of knock knees and bowlegs in infants with normal skeletal development and stressed the importance of eliminating this mechanical factor in the treatment of these conditions. Lloyd[4] believed the commonest deformity of knock knees to be the static condition secondary to weak or valgus ankles. He thought that the valgus ankle always antedated the knock knee and that the lateral shift in the line of transmission of body weight stretched the internal ligament of the knee joint. It was his opinion that with the exception of renal rickets, rickets *per se* is only occasionally an etiologic factor. Kellgren[5] believed that in addition to rickets, the large, bulky diaper is a prominent causative agent in infantile bowlegs and urged reduction of this mechanical mass between the femurs. He thought that knock knees occur in two distinct types of infants: the healthy, vigorous, stout child who is encouraged to walk too soon and the thin, undernourished child with poor general muscular tone. He considered the primary factor to be the fact that the muscles of the leg are not strong enough to support the weight of the child's body. The internal lateral ligament of the knee stretches and the biceps tendon produces external rotation of the tibia on the femur. He believed that an intramalleolar difference of three-fourths of an inch with the child in a supine position is normal for children between the ages of 18 months and 4 years and stressed as an important point in diagnosis, standing on hyperextended knees and abnormal lateral motility and external rotation of the tibia on the femur. Brittain,[6] who has seen over 8,000 cases of genu valgum during fifteen years, believed that few cases of knock knees are due to rickets but considered as the underlying causes laxity of the ligament or loose knee, quadriceps insufficiency and overweight.

In the Crippled Children's Clinic in New Orleans, of 99 cases reviewed, the average age was 23.7 months when the patient was first seen; the oldest patient was 39 months and the youngest 10 months. Fifty-eight of the children were Negroes and 41 white. Clinical skeletal rickets, as evidenced by rachitic rosary, Harrison's groove, cranial tabes, potbelly, abnormal thorax or other stigmas generally associated with rickets, was present in 75 per cent of the 52 cases of bowlegs and 32 per cent of the 47 cases of knock knees. It has been my own personal observation that knock knees not caused by rickets are associated with flabby musculature of extremely poor tone, as well as an extreme amount of relaxation of all joints, producing valgus feet and hyperextension of the knees, elbows and metacarpophalangeal joints. Moreover, it is encountered in malnourished, underweight individuals as well as in the overweight. Those with bowlegs frequently have an extreme amount of internal tibial torsion which persists stubbornly after the general alignment of the extremity has been restored to normal.

Treatment of bowlegs and knock knees varies considerably in different parts of the world. It is universally agreed that patients with active rickets should receive curative doses of vitamin D, sunshine or ultraviolet ray and that the valgus feet associated with both bowlegs and knock knees should be supported by the use of medial wedges on either the heel and sole or the heel of the shoe.

Forrest,[7] who reviewed the cases of 31 patients with bowlegs, 13 of whom had clinical evidence of rickets, secured complete correction in 27 patients in an average of 13.5 months by the use of adequate doses of cod liver oil, mild manipulations at home by the parents and use of inner heel wedges on the shoes. Three of these patients required osteotomies, and in one, correction was obtained by a distraction cast and turnbuckle. He cautioned against radical correction by osteotomy until a child is 4 to 6 years of age and one is certain spontaneous correction will not occur.

In the treatment of knock knees, Brittain[6] places most of his reliance on wedging of the sole and heel of the shoe and use of a night splint of the Lloyd type. If the child is less than

4 years old and has less than 2 inches of separation of the malleoli, he uses wedges on the shoes only. For the child more than 4 years old with the same separation, he uses wedges in the sole and heel of the shoe combined with the Lloyd splint. If the patient has more than 2 inches of separation of the malleoli and is below the age of 4 years, wedged shoes and night splints together are used and if the patient has more than 4 inches of separation of the malleoli and is above the age of 7 years primary osteotomy is performed. He mentions stapling of the medial epiphysis but apparently has never done it and doubts the value of knock knee braces.

Girdlestone[8] believes that most of the mild and moderate cases will respond to conservative treatment consisting of wedging heels, dietary restriction and restriction of activity. He uses night splints for knock knees only in resistant cases and has found it effective in these instances.

In the treatment of knock knees Lloyd[4] thinks that therapy should be directed first to the valgus ankle, correction of which, in turn, will prevent or minimize further progress of the knock knees, and he uses shoe correction up to the age of 3 years and night splints of the Lloyd type if shoe correction for six months is unsuccessful. If the child is 5 years of age and has 3 inches of separation of the malleoli, he uses a splint day and night until correction is obtained. Manipulation, wedging and plaster cast and use of various types of ambulatory braces have all been advocated as conservative measures.

Encouraged by the reports of Wolf[9] and of Rambar and associates[10] on the use of electrically activated ergosterol in massive doses in infants as prophylaxis against rickets, for the past five years, we have administered this preparation* rather routinely to the patients with infantile bowlegs and knock knees accepted for treatment in the Crippled Children's Clinic conducted by the Louisiana State Board of Health in the New Orleans district. This preparation is supplied in capsules, each containing 100,000 U.S.P. units of vitamin D. In very small children, capsules were administered orally either by emptying the contents of the capsule into milk or water, or by sprinkling it on cereal, and in larger children, the capsule was swallowed directly. In some instances for the initial dose or when it was evident that it would be difficult to secure cooperation of the parents, ertron,® 600,000 U.S.P. units of vitamin D, was given parenterally. These preparations were administered under the direct supervision of the pediatricians who were in constant attendance at the Clinic. The usual routine of administration was to give one capsule of infron® (100,000 units) weekly for six weeks, then one every two weeks for six weeks followed by one capsule monthly depending on the rate of improvement. When ertron® was used, it was usually given every two weeks for two or three doses depending on the progress of the case and then followed by oral administration of infron.® The average total amount of infron® administered per case was 1,600,000 units, the maximum 5,500,000 units and the minimal 600,000 units. In addition, in the moderate and severe cases, if possible, shoes with 3/16 inch inner wedges to the heels were supplied, although in this class of patients it is questionable how much real correction the shoes give, for in spite of instructions, the shoes supplied are allowed to become run down, and these children frequently go barefooted.

In the entire series 58 patients were followed long enough and accurately enough to permit statistical evaluation of results. The severity of the deformity when first seen was judged by the intramalleolar distance in knock knees with the patient standing and the intrachondylar distance in bowlegs with the patient standing. Those with less than 2 inches of separation were considered as mild, those with 2 to 4 inches as moderate and those greater than 4 inches as severe. There were 40 cases of bowlegs, of which 10 were mild, 17 moderate and 13 severe; 32 or 80 per cent had clinical evidence of rickets. The diagnosis in most cases was verified roentgenographically. Of the 18 cases of knock knees, 3 were mild, 13 moderate and 2 severe; 8 cases or 44.4 per cent had clinical rickets.

In the group with bowlegs, the average number of months required for correction of the deformity was 10.4, and in those with knock knees it was 14.8. Four patients required additional therapy, in the form of braces, before complete correction was secured. In 4 patients the use of a modified Denis Browne splint was necessary at night in order to correct the residual internal torsion of the tibia. In 2 patients osteotomies had to be performed. Six patients were improving but have not been followed sufficiently long

*The preparation used was electrically activated vaporized ergosterol (Whittier process) called infron pediatric,® which was kindly supplied by the Nutrition Research Laboratories, Chicago, Illinois.

to complete the correction. In only one patient did any symptoms develop which could possibly be associated with toxicity. This patient had some nausea following administration of 600,000 units. The next capsule was omitted and treatment was then resumed without any difficulty. Unrestricted activity was allowed in all patients.

In the preparation of this report it was originally intended to compare the group in which ergosterol had been administered with a similar group treated before this drug became available. It was found, however, that the conditions were too variable and the records not accurate enough to make any reliable comparison. However, we are certain that with the adjunct use of infron,® correction has been obtained in a much shorter time in those with knock knees and bowlegs both with and without rickets than was obtained on this service previous to its administration. The necessity for adjunct therapy in the way of braces, night splints, wedging casts and other apparatus has been greatly reduced. The number of cases in which correction is not obtained and subsequent surgical treatment is necessary, has been considerably minimized. Many of these patients had received large doses of various types of cod liver oil and other forms of vitamins previously without results in an attempt to control the deformities. It is my belief that administration of these amounts of vitamin D in the form of infron® pediatric is entirely safe. This opinion has been substantiated by Albright, Butler and Bloomberg,[11] who have given as much as 1½ million units of vitamin D daily in the treatment of refractory cases of rickets. Young children frequently spit up or regurgitate vitamin D when it is given in other forms. Moreover, parents are careless when daily administration is required. In addition, the other forms are expensive and their dosage is difficult to control.

It is realized that the observations and impressions reported in this paper are based entirely on clinical evidence and the importance of laboratory determinations of serum, calcium, phosphorus, alkaline phosphatase, and urinary excretion of calcium as well as the performance of the Sulkowitch test and routine roentgenographic follow-up examinations in such cases is clearly recognized. However, such a program is impossible under the conditions under which we work, particularly in the field clinic, and of necessity most observations are based entirely upon clinical impression.

SUMMARY

Infantile bowlegs and knock knees still constitute an important part of the conditions treated in the Crippled Children's Clinic in New Orleans. Despite the many vitamin preparations now available, the incidence of clinical skeletal rickets associated with bowlegs and knock knees is still high.

Moderately large doses of activated ergosterol can be administered safely, conveniently and economically to the average clinic patient. The clinical results of such treatment in 58 cases in our own hands have shown a reduction in the time required for correction of these deformities, elimination of the necessity for adjunct apparatus to a large extent and considerable reduction in the number of operative procedures required subsequently.

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DISCUSSION (*Abstract*)

Dr. William J. Stewart, Columbia, Mo.—I should like to call attention to the importance of at least one skeletal x-ray examination. Recently I had occasion to review a case of unilateral genuvalgum associated with poliomyelitis. Three osteotomies had been done upon the patient before an x-ray of the knee revealed the cause to be associated with irregular epiphyseal development, not rachitic in origin. I am in accord with Dr. Morris' physical observations and findings in his series of cases of knock-knee and body deformity.

In treatment, (a) I should like to emphasize the value of high vitamin therapy; and (b) I should like most emphatically to de-emphasize the use of braces and wedges. Naturally one should recognize that flat valgus feet and ankles should in themselves receive attention, but I am sure that Dr. Morris and others have seen a considerable number of patients with simple knock-knee deformity with quite good feet and ankles. It seems to

me that the principle function of corrective wedges in these cases is to insure the periodic return of patients for re-examination, at which time the other elements of therapy can be reviewed and re-emphasized. I fail to see any value in the use of corrective braces, especially in bowleg extremity deformities. I have had no experience with Dr. Morris' particular therapeutic regimen but intend to give it serious trial.

As Dr. Morris emphasized, surgery is rarely needed in correcting these deformities in children under five to six years of age.

Dr. Morris (*closing*).—With poor people down in Louisiana, about 25 or 30 per cent of our office practice is composed of these minor points, which are foremost in our minds.

PHYSIOLOGIC LABOR WITH SADDLE-BLOCK ANESTHESIA FOR DELIVERY*

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INTRODUCTION

Physiologic labor is as old as the human race, but it has not been practiced by the modern obstetrician to any extent until the writings of Grantly Dick Read were publicized. Although his ideas have been reported to the physician in the medical literature, the impact of his theories has been felt with much greater force by the general public through the publication of his book[1] "Childbirth Without Fear," and its condensation[2] in popular periodicals. Many medical centers[3] are conducting surveys with this type of labor in this country, but few reports were available until Thoms[4] thorough discussion of his results at Yale were published in his recent book "Training for Childbirth."

Unfortunately many of the medical profession, and laity as well, have apparently been misled into believing that a new method of "painless childbirth" is offered, and they have properly scoffed at the entire program. No one has claimed that a supervised labor is without pain, but we are convinced that it can be less painful than the ordinary labor.

We have used this method for fourteen months in conjunction with saddle-block anesthesia for delivery, and are reporting our experiences as they affect a practitioner in private practice.

PRENATAL INSTRUCTIONS

Fear and tension are the generators of pain in the laboring human female. Pain perception increases proportionately to the level of fear and tension. Obliterate fear and tension and pain naturally decreases. This physiologic principle has been adequately established.

Putting these principles into practice does not ease the obstetrician's task and many more hours are added to the care of each individual patient. Two simple fundamentals must be attained:

(1) Fear must be banished.

(2) The patient must be taught how to relieve tension by relaxation.

Fear is abolished by a thorough educational campaign to acquaint the patient with the fundamental anatomy and physiology of pregnancy and labor. Because every moment is precious in a busy physician's office, it is impossible to have adequate time to instruct each and every patient individually. Therefore, a series of lecture and discussion periods are given in the evening when the prospective mother is free to come to the office with her husband. Groups of twenty or thirty patients are the maximum that can be handled adequately. Four classes at weekly intervals are offered. Each series is repeated every month, so that if a patient misses one period she can make it up the following month.

The first lecture consists of a rather general but thorough discussion of the normal anatomy and physiology of the woman's reproductive system, and the development of the fetus *in utero*. Attempts are made at this time to correlate many of the symptoms associated with changes taking place in the maternal organism. Charts, diagrams, and lantern slides clarify the discussion.

The second lecture consists of a thorough discussion of the physiology of a normal spontaneous delivery. The general outlines of the methods of relaxation are introduced. Patients are told exactly what to expect when labor begins and they go to the hospital. They are told about the preparation of their perineum, the usual enema, prophylactic vitamin K, and how labor should be conducted. They now have a rather complete knowledge of the functions of uterine contractions and the method by which the infant passes through the birth canal. Most of their fears of the unknown have been eliminated. How-

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ever, they still naturally evidence apprehension regarding the pain of labor, since they have either had a thorough indoctrination into the agonies of labor by many of their well wishing friends or relatives, or they may have actually experienced the pain of labor with a previous delivery. They are rather hesitant to accept the word of an obstetrician, whom they have known only a few months. It is pointed out that one of our fundamental instincts is self-preservation, and that to avoid pain we adopt a protective reaction in anticipation of painful stimuli. The painful appreciation of a uterine contraction increases in direct proportion to the degree of tension. Fear and anxiety superimposed upon this state of tension naturally increase the pain even more. The opposite holds true, namely: that the pain from the uterine contraction decreases in direct proportion to the ability of the patient to relax. Patients, therefore, are advised to relax completely with the onset of each uterine contraction. They are advised to make themselves as comfortable as possible in the bed, to relax their extremities, to close their eyes, and to control respiration by breathing evenly and deeply, making inspiration approximately equal to expiration. They are to concentrate on relaxation of the perineum to such an extent that it might appear they will soil the bed with stool because of the relaxation of the rectum. It is pointed out that relaxation is difficult, and that one must concentrate to be able to overpower one's inherent desire to become tense at such a time. In order to prove to themselves that what we have told them is true, they are advised to relax for a dozen contractions and then forcibly tense themselves as hard as possible with the next succeeding contraction. The pain experienced with this contraction, associated with tension is dramatically adequate proof that relaxation is effective. In the first two lectures, attempts are made to correct misapprehensions and old wives' tales that are frequently associated with pregnancy. The Rh factor and its significance are discussed. It is surprising how many rather intelligent questions patients will ask in a group of this kind that they might not think of in their individual visits to the office. Not only does a lively discussion ensue, but the entire atmosphere of the meetings promotes a general feeling of mutual enthusiasm among these patients who will probably deliver about the same time.

During the third class period, supervised instruction is given in methods of relaxation and prenatal exercises. Suggested training in relaxation is advised according to the plan outlined by Helen Heardman[5] in her book "A Way to Natural Childbirth." These classes can be conducted by the physician unless he is fortunate enough to have a well qualified obstetrical nurse. She is frequently more capable of bringing out a thorough discussion than is the doctor.

During the fourth session a technicolor movie of a normal delivery from the time of admission to the hospital to the completion of the delivery is shown to those patients who desire to see it. This graphic pictorial evidence appears to be an excellent method of propagandizing the soundness of this concept of labor.

When each patient is approximately six weeks from term, a fifteen-minute discussion is given by the physician, reviewing much of what had been given in the lectures and reiterating the desired procedure to be followed during labor. At this time the patient is assured of her probability of a natural delivery or is acquainted with any abnormalities or complications which may make delivery by some other route more advisable.

LABOR

When the patient is admitted to the hospital it is very important that the physician or his trained assistant be present during the early part of the first stage. It is necessary to reassure the patient that all is going well and to advise her and correct her in her attempts at relaxation. It is at this time that the value of this method can be readily demonstrated by having the patient tense herself during one contraction and compare the resultant pain with the decrease in pain when she is relaxed. It is explained to the patient that sedatives are not withheld from her simply because she is trying out a new technic, but that the usual demerol® and scopolamine® are given not primarily for the purpose of relieving pain, but to facilitate relaxation.

At the beginning of the second stage, in the primipara, relaxation is much more difficult because of the very short interval between contractions. Her concentrated efforts must be at a maximum. As the presenting part descends through the pelvis, she complains of pressure in the perineum and frequently of pain in her back. The latter can be decreased by massage over the sacrum, and when the patient understands that pressure means progress, she is quickly satisfied.

DELIVERY

When the cervix is fully dilated in the primipara or five centimeters dilated in the multipara and the presenting part is near or on the perineum, the patient is taken to the delivery room. Although we are thoroughly convinced of the value of relaxation in normal labor, we do not believe that a full term fetus can pass through the average white female perineum without some damage to the muscular structures. The skin may stretch greatly, leading one to believe that no laceration has occurred, but the underlying, less elastic muscles are too frequently torn, leading to poor perineal support. A median episiotomy through the fibrous raphe rather than the belly of the muscles is chosen in most instances. Rectal lacerations are usually no more common than with the medio-lateral episiotomy if delivery is conducted carefully.

Because of our perineal perspective we have departed from Dr. Read's method with the use of saddle-block anesthesia for delivery. This anesthetic permits shortening the perineal phase for the convenience of both physician and patient, and detracts in no way from the desirabilities of a natural delivery. The patient, in fact, is greatly relieved to know that her work has been completed, and the physician will now take charge of the delivery. She is able to see her baby the moment it is born and follow the details of delivery with added interest. After the baby has been properly identified, she may hold it in her arms while the episiotomy is being repaired. We should again like to emphasize our opinion that saddle-block anesthesia, not only does not change the concept of physiologic labor, but will probably be responsible for more general acceptance of this method in this country. It is a safe anesthetic in the proper hands. It is rarely unsuccessful, and the incidence of complications has been very low.[6] It is the ideal anesthetic for complete relaxation of the perineal structures, and is particularly applicable to operative delivery. Since there is no anesthetic effect upon the baby, anoxia is not a problem. The anesthetic level is such that uterine contractions are not inhibited, motor-power to the lower extremities is retained, and complete anesthesia of the perineum and birth canal is obtained.

CONCLUSION

Although our series of cases is too small to use for statistical purposes, we have garnered the general impression that more than 90 per cent of the patients have been very enthusiastic over the use of this method. It is felt that the duration of labor is shortened in most instances. The maternal instinct appears to be aroused to the fullest. Most of the mothers wish to nurse their babies. The obvious surprise on the faces of the husband and relatives as the mother is wheeled from the delivery room smiling enthusiastically as she very proudly describes her delivery and shows off her newborn, is very gratifying.

Many problems must be solved and our own obstetrical concepts must be altered before we can expect this method of delivery to be completely satisfactory. Labor departments are generally a noisy, mad-house, supplied with the most uncomfortable beds in the hospital. A homelike atmosphere must be created. Obstetrical nurses must have special training. A nurse in the labor room can destroy the effectiveness of the entire program with a few ill chosen words. The patient must have someone with her at all times for encouragement and to massage her back when the descending presenting part causes pressure in the pelvis. Unfortunately most labor departments are too busy for a nurse to be in constant attendance, and only when we are able to permit a well indoctrinated husband to stay with his wife during her labor will we obtain this goal.

It is also important to have rooming-in nurseries available where the patient can have her newborn with her most of the day. It is quite abnormal to take the baby away from its mother except for feedings, and not even allow her to change the diapers, or bathe her baby before she goes home. We, of the medical profession, have established these labor departments and it is our responsibility to change them. We have also molded public opinion by our emphasis upon pain in labor, not only in our own publications, but in lay magazines. This emphasis is just as bad as the gruesome details discussed by the female horror programs over the bridge table.

SUMMARY

When fear of childbirth is removed by an adequate and thorough educational program in conjunction with thorough instructions in the methods of relaxation, the painful elements of the first stage of labor can be greatly diminished. This program carried out in conjunction with saddle-block anesthesia for delivery appears to be the most ideal method of childbirth at the

present time. The gratitude of one's patients is well worth the investment in time and trouble. We believe we are entering a new era in obstetrics with this method of labor. It should ultimately change the concepts of labor as taught to our medical students, and the practices and physical plants of our maternity hospitals.

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DISCUSSION (*Abstract*)

Dr. W. Reed Wood, Greensboro, N. C.—I am very happy that Dr. Ellingson has avoided the use of the term "natural childbirth." I think that the most interesting part of it is that he has been able to adapt its use to private practice. By no stretch of the imagination could it be done successfully in our area on a scale to compare with his (the towns are about of equal size). The demands for relief of pain in labor cannot be ignored. It is actually painful, by all methods of recording painful stimuli, to have a baby. That fear increases the tension, which in turn causes more pain, we will not argue about. All these factors cause an increase in the amount of analgesia and anesthesia necessary in the conduct of labor.

Dr. Ellingson has presented a challenge to all of us better to inform our patients of what pregnancy, labor and delivery is about. His program of prenatal instruction is the most complete we have ever seen from the standpoint of the private practitioner, regardless of the method to be used in the actual conduct of the labor.

The well educated and more psychologically mature patient is the type we all prefer to deal with. To mature a patient psychologically in a few short months that we have her as prenatal patients when their mothers, the schools, and the tenets of their society have failed, is a bit more than can be expected. I do not believe it possible to substitute prenatal instruction for the emotional maturity necessary to carry out this program on a large scale.

In our few years of private practice, I have made no effort to try to make obstetricians out of the patients. We have tried to keep the patients well informed as to their status, to instruct them in dietary, physical, and emotional factors concerned in their pregnancy; and to tell them what to expect as to the onset of labor, as far as we can predict it in advance. Most of this is concentrated toward the end of the pregnancy. Constant attention of a trained attendant, preferably the obstetrician concerned, is the best method I have found to reduce the amount of sedation analgesia and anesthesia necessary in the conduct of labor. After all, this is the principal reasoning for the return to the more natural methods of childbearing. None of us would deny the implications of over-sedation and anesthesia, but their intelligent use, and the careful attendance of the obstetrician or his trained associate should obviate the necessity of return to old days when babies were all born in the "raw." The admitted use of analgesia during the first stage and the use of saddle-block anesthesia for delivery removes the essayist's method considerably from the actual title of the essay.

There are several questions that I should like to ask Dr. Ellingson: (1) how many patients changed their minds and required more than the amount of analgesia for "aids to relaxing"? (2) I should like a brief report as to their comments at postpartum visits and their willingness to do it again; (3) this is hardly related to the subject in general, but I should like to know the number complaining of postspinal anesthesia headaches.

Dr. Willard M. Allen, St. Louis, Mo.—Obstetricians throughout the country are perforce realizing that there is a great change in the attitude of pregnant women toward pregnancy. We tend to give the credit for this to the popular essays of writers such as Grantley Dick Read, Herbert Thoms and many others. Certainly these and the writers for the popular magazines deserve great credit for the impact which the new ideas have had on the modern woman. We must remember, however, that the success of propaganda, for that is what it is, depends on the willingness of people to accept the propaganda. This means that the American woman and her physician accept the new ideas regarding natural childbirth. My questions are: Would most women prefer to have the pains of labor if they could be safely and pleasantly avoided? Would her physician insist that she go through the pains of labor if they could easily and safely eliminate those pains? I think not, but that is, of course, only an opinion. I think the reason so-called "natural childbirth" is coming again to the front is to be found in a general and fairly abrupt revolt on the part of women and doctors alike against the evils of twilight sleep, induced labors, sleeping babies and the assembly line handling of women and babies in the so-called modern hospital. Childbearing is a supremely intimate and personal experience and, nowadays with most babies planned, is anticipated with enthusiasm and confidence by the parents-to-be. Yet the woman still requires some tangible force to which she can cling. At one time it was the midwife, or an experienced member of the family. Now it is the physician who becomes the Savior for the occasion.

Can you imagine anything worse than being greeted in a maternity hospital by an admitting officer who asks about your income, a delivery room nurse who gives an enema, a sleepy intern whom you never saw, and a room with sounds in the distance of crashing pans and moaning patients. Add to this forced separation from your husband at a time when you are entering a completely strange experience. But such is the atmosphere today in most large maternity hospitals. Small wonder then that doctors and patients alike want a change.

The methods which Dr. Ellingson has described and found satisfactory are, of course, not new. Classroom instruction of a group of patients and their husbands, the critics may say, is no more than they have been providing for years in a more personal way by private

conversation between patient, physician and husband, and such may often be the case. Group discussions, however, have much in their favor over and above the obvious saving of the physician's time. Groups bring together several people with common and similar problems. They produce a greater variety of worthwhile questions and they inevitably eliminate the family bickerings that may become too obvious in more private talks. They give the members of the group an incentive to strive for the best, an interest in how the others are handling their affairs and a sincere sympathy for those who may not fare so well. Like patients in a tuberculous sanitarium or in a cancer clinic, the group meeting brings out the best rather than the worst aspects of human nature. There will always be situations that cannot be handled by group discussions but these are relatively few. I have a feeling that more and more busy physicians will find the same general benefits of group education as Dr. Ellingson, once they have given it a trial.

The more reactionary members of our profession may say that the use of terminal saddle-block anesthesia is no better than the use of inhalation anesthetic agents of one sort or another. The neo-psychiatrists may say that the elimination of pain by saddle-block, or caudal analgesia or even the use during labor of pain-relieving agents such as demerol® denies the patient the durable satisfaction of having delivered a beautiful child after a horrible ordeal. I seriously doubt both of these contentions. In the first place, no one who has not seen the look of satisfaction on the face of the new mother as her baby is handed to her after a completely painless delivery under some form of local analgesia, can fully appreciate the pleasant and satisfied feeling which both the patient and her physician experience. Being awake at delivery satisfies the patient for all time that she had a baby and that the baby is really hers. In the second place, I cannot believe that the woman's mind is so constituted that she must have the experience of suffering during the delivery of her child in order that she may have a completely wholesome attitude toward her children, her husband and society in general. She will have plenty of opportunity to worry and suffer during the time when the brood is still under her wing! This attitude deserves about as much merit as should be found for the equally bogus contention that antibiotics should be withheld from patients with lobar pneumonia because most of them would live through it anyhow. Yet there are those who believe, in all seriousness, that the woman's mind is more enobled by a labor which she can tolerate without pain-relieving agents than by a labor where much of the pain has been eliminated by chemical agents. True enough, a modest portion of suffering brings people closer together, and makes them more tolerant and loving, but too much misery does just the opposite. It destroys all that is good in many people and makes them afraid, or hard and fatalistic.

The human mind usually accepts without serious complaint those situations over which man has no control, but those situations are ever changing. Primitive people doubtless accepted as fate the death of an undeliverable mother. Modern society would consider it malpractice. It is folly, therefore, to assume that modern woman's mind is enriched by a reversion to primitive methods of labor and delivery, enlivened to be sure by television rather than witch doctors, when modern medicine has available good and safe methods for relieving pain. To deny the woman the benefits of these modern agents under the guise that an unassisted labor is better for her is the same as saying that her doctor's tremendous personality is better than the witch doctor's headdress. It is plain bunk. Dr. Ellingson's use of terminal saddle for delivery, coupled with sensible instruction during the pregnancy and probably a modicum of sedation where needed, does not indicate to me that he subscribes to the popular hoax, natural childbirth without pain. They prove that what he is describing is his appraisal of an approach to modern obstetrics which satisfies the public clamor for a new and more desirable solution of the problems arising during pregnancy and labor.

Finally, a word of caution. Women have been delivering their babies without much help for milleniums and most of them still can. Our attempts to make the ordeal a pleasant one should not subject the patient to unwarranted risks. Perhaps saddle-block is ideal, or perhaps caudal is better, or perhaps even the glorious accomplishment of a completely natural birth is best, but we should all remember that none of the fanfare dealing with the esoteric aspects of pregnancy and delivery has been responsible for the low maternal and infant mortality rates prevailing in the civilized world today. None of the new methods can replace one single bit of the teaching and practice of good obstetrics. They can only supplement them.

Dr. Ellingson (*closing*).—The information Dr. Wood requests cannot be given in exact figures since the statistical tabulation of our results for a forth coming paper has not been completed. We can say, however, that practically all our patients have at least one hypo of demerol and scopolamine. More than 75 per cent of the patients who have followed the program have indicated that they would choose to have their next child in the same manner. Postspinal headaches, of course, have occurred; the incidence has not been high enough to consider it a problem, but again we are unable to offer definite statistics at the present time.

Improved prenatal care has been one of the most important factors in lowering our maternal and infant mortality rates. In our endeavor to maintain normal parturient physiology, however, we too frequently forget to satisfy the patient's emotional and intellectual appetite. Pregnancy then becomes a disease rather than a "state of being" and prenatal visits are often remembered as a series of blood counts, urinalyses, and blood pressure determinations.

Although obstetricians are primarily physicians, we must also be considered salesmen of a sort and, like salesmen, the service or commodity we offer must be acceptable to the majority of our customers. The Read method of natural childbirth in its entirety will probably not meet this requirement. We have, therefore, attempted to utilize the practical aspects of this method to prepare women for labor. By decreasing their fear and tension (particularly during the first stage of labor) in conjunction with the common sense use of modern anesthesia for delivery, our commodity becomes acceptable.

COOPERATION BETWEEN ORGANIZED MEDICINE AND PUBLIC HEALTH*

By N. H. DYER, M.D.†
Charleston, West Virginia

Public health today has a far greater meaning than the prevention or control of diseases. The field has been broadened to include programs for the promotion of complete physical, mental and social well-being of the total individual and the total population of the community, county, state and nation.

For any public health program to succeed it is imperative that there be complete cooperation between the private physician and the health department. Better still, there should be a definite partnership between the family physician and the local health officer, both working side by side toward a common goal, to provide better total health protection for the entire community.

It seems rather odd that we should be discussing the subject, cooperation between organized medicine and public health. We take it for granted that there is now, and will continue to be, cooperation between organized medicine and surgery, pediatrics, obstetrics and other specialties of medicine. Why should we not have the same cooperation for the specialty of public health?

Granting that there exists a lack of cooperation or partnership between organized medicine and some health departments, then let us ask ourselves why this is true. Is it because the public health activities are not closely related to the programs of the medical profession? I do not think so. If a health officer finds that his program does not fit in with the thinking of the medical profession he should make every effort to adjust the situation. Is it because there is a lack of a definite understanding between the general practitioner and the health officer pertaining to their duties and responsibilities for better community health? In my opinion this is the most important reason why we do not have better working relations between organized medicine and health departments. The private physician should understand that to provide good health protection for all the people of his community he must have the assistance of a full-time, well organized health department. The health officer must realize also that public health services are less beneficial when there is a lack of cooperation on the part of organized medicine.

In my state of West Virginia we are endeavoring in every way possible to bring about complete understanding between public health personnel and the state and local medical societies. We have agreed that the aim of our united efforts shall be, total health protection for the total population of the state. It is understood that the health departments are not interested in practicing curative medicine, that the public health field is prevention of disease, assisting in case finding and diagnosis, and helping to provide expensive equipment and facilities for treatment. The physicians are requested to participate in our clinical programs. They are paid on a fee-for-service basis.

I shall briefly point out some of the health programs in West Virginia which were organized and are being sponsored jointly by the State Department of Health and the medical profession:

(1) In 1943 the State Medical Association and the State Department of Health jointly recommended to the Legislature that fifty thousand dollars be appropriated for a program for treatment of indigent cancer cases under the supervision of the State Department of Health. The amount of the appropriation has since been increased to seventy-five thousand dollars. The House of Delegates of the State Medical Association at the recent annual meeting recommended that this amount be increased to one hundred thousand dollars per year, and this increase has been included in our biennial budget request. In the last fiscal year over one thousand citizens requested financial assistance from this cancer control fund. These patients are referred to the service by practicing physicians, cancer clinics, local health departments and welfare agencies. Provision is made for diagnosis in general hospitals and those needing treatment are referred to near by treatment centers for surgery, x-ray or radium therapy. The follow-up work indicates the value of this life saving program. At least one hundred and twenty-five persons are known to be alive today as a result of treatments given during the first year of the program 1944-45.

(2) During the 1949 Legislature an act was passed reorganizing the State Department of Health. This act was sponsored by the legisla-

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†State Director of Health, West Virginia Department of Health, Charleston, West Virginia.

tive committee of the State Medical Association. The most important part of this reorganization act was to abolish the then existing Public Health Council, and create a separate Medical Licensing Board and the West Virginia Board of Health. The nine-member board of health has professional and citizen representation. Three physicians are members of the board and the state director of health is secretary.

(3) The 1949 Legislature passed the necessary legislation setting up the biennial registration of physicians under the administration of the State Department of Health. This registration program affords an excellent opportunity for the State Department of Health to keep in closer contact with the physicians, by the establishment of a state register with the names, addresses, type of practice, and other pertinent information of all licensed physicians of the state. This register is extremely helpful in distributing public health information to the practicing physicians. According to the law, every two years all licensed physicians make an appiication to the State Department of Health for reregistration and pay a fee of two dollars to cover the cost of administration of the act. If the physician is eligible for reregistration he is sent a wallet size registration card signed by the State Director of Health as Secretary of the State Medical Licensing Board.

(4) The tuberculosis control program was given a tremendous boost when the 1949 Legislature abolished the so-called "means test" for hospitalizing the tubercular, and now all beds in the sanitoria are state maintained. The State Medical Association and the State Tuberculosis and Health Association were responsible for having this act passed.

(5) Private physicians are giving valuable assistance in the follow-up work in our tuberculosis control program by giving out-patient pneumothorax refills and other needed treatment services. At the recent annual meeting of the House of Delegates of the West Virginia Medical Association a resolution was passed in support of the request by the State Department of Health of the 1951 Legislature to appropriate sufficient funds to continue and expand this important outpatient pneumothorax treatment program.

(6) The state director of health is ex-officio member and secretary of the State Medical Licensing Board. This arrangement gives the state director of health an opportunity to meet and discuss health problems with the young physicians who are beginning their practice throughout the state. They are given copies of current printed materials which prove helpful to them in starting practice. Such materials include a copy of the public health laws of the state together with the regulations as approved by the State Board of Health, a copy of the State Hygienic Laboratory policies and procedures, instructions for completing birth and death certificates, and a copy of the latest edition of "The Control of Communicable Diseases in Man" published by the American Public Health Association and adopted by the West Virginia Department of Health.

(7) In our maternal and child health program we are receiving excellent cooperation from organized medicine. In the last fiscal year forty new well-child conferences were initiated, bringing the total to one hundred and fifteen such services located throughout the state. During the last fiscal year more than twenty thousand children were given health supervision at these conferences. This would have been impossible with our limited medical personnel in the local health departments without the clinical services of private physicians. Our premature center at South Charleston is receiving excellent cooperation from the pediatricians of that community.

(8) Venereal disease clinics for the diagnosis of venereal disease are operated in fifty-three of our fifty-five counties with practicing physicians on a fee-for-service basis, cooperating with the local health departments. The private physicians are assisting in making our Rapid Treatment Center a success by referring to the center those cases they do not care to treat.

(9) Currently we are working on joint proposed legislation to present to the 1951 Legislature to expand our two-year medical school to provide a four-year medical and dental school, together with the necessary teaching hospital facilities. In West Virginia we have, as is true in many other states, a critical shortage of physicians. Figures compiled from information obtained from our biennial registration shows that we have the ratio of one physician for fourteen hundred population. Since our population is approximately 72 per cent rural, many communities do not have the services of physicians.

(10) The State Department of Health has cooperated with the public relations committee of the State Medical Association in sponsoring rural conferences on health and medical care. Those

attending besides the sponsors were representatives of rural health consumer groups, such as, the Farm Bureau, the Farm Women's Council, the West Virginia State Grange, and the West Virginia University. Plans were outlined at these conferences to provide better medical care for the rural population by expanded hospital facilities, health centers, clinics, and full-time health departments for the entire state population.

In discussing our cooperative health programs in West Virginia, I do not mean to imply that we surpass other states in this respect, or that we know all the answers. We do believe, however, that much benefit is being derived by these joint efforts.

In conclusion, I should like to emphasize the fact that today public health is rapidly expanding; the services are broadened; it has become a definite specialty of organized medicine. For a population to derive the maximum benefits from public health services, it is necessary for the health officer and the private physician to form a definite partnership to work together as a team for the promotion of complete physical and mental well-being as well as freedom from disease and infirmity for each individual of the community.

Such united efforts on the part of organized medicine and the health departments would certainly be a setback for those advocating socialized medicine. Such a combination would provide complete health protection for those areas not now adequately served. There would be no need for a change in our system of medical practice.

If we had complete and total cooperation between the health departments and organized medicine in the entire United States, I can see for the people a health program broad enough to insure that no person be denied needed medical care. If the medical profession, the official and voluntary health agencies, along with other professions and governmental agencies, work together, our country can be made a healthier and happier place to live.

DISCUSSION (*Abstract*)

Dr. Thomas G. Hull, Chicago, Ill.—For many years I was in the Illinois State Department of Public Health and later with the American Medical Association in Chicago, and I have been happy to note the improved relationship of public health and the rest of medicine. I like to think of public health as one of the specialties of medicine and it irks me to hear people separate the two, public health and medicine. Public health is part of medicine and the relationship has improved materially. Granted there are personalities that interfere from time to time, but the trend and the ideal are to bring the two together.

CHEMICAL BURNS OF THE EYE*

By RALPH S. MCLAUGHLIN, M.D.
Charleston, West Virginia

Four years ago this month I published in the *American Journal of Ophthalmology* a paper entitled "Chemical Burns of the Human Cornea." A joint paper in the same journal was published by my co-workers, Smyth and Carpenter, on the subject, "Chemical Burns of the Rabbit Cornea." All of the published work was based upon experimentation carried out by the Research Fellowship of the Carbide and Carbon Chemicals Corporation at the Mellon Institute in Pittsburgh and in my own practice as Consulting Ophthalmologist for that same corporation at the South Charleston and Institute plants.

Our work has been the target of no small amount of both favorable and unfavorable discussion. In order to clear up the misunderstandings that have accrued, it is well to state our position. The group at Mellon Institute has not continued any set program of research except as it concerns the effect of new drugs on burns artificially produced on rabbits' eyes, and then only at the request of the company ophthalmologists. As for additional work on my part, I have been unable to demonstrate anything of great worth which adds materially to the work already published. I should also add, at this point, that the nature of my work is on the clinical side. I have found in my practice that the prime interest is in results to the patients. We are, at the present time, well past the 6,000 mark in number of burns treated and we are still showing a consistent success in treatment to the extent of a 2 per cent incidence of loss of vision following chemical burns. These losses cover all causes, including failure of the patient to cooperate, breaks in technic of the first aid rules and patients having focal infections which have caused complications not directly due to the chemical but nevertheless occurring in burned eyes.

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The definition of a chemical burn is probably the most debated point of current literature on this subject. In our original work, and still today, we use a clinical and not a technical definition. A chemical burn is an exposure to a chemical, liquid, gas, or solid, which results in any damage to the cells of either the cornea or conjunctiva. This damage is indicated by a positive stain by fluorescein and confirmed by examination with the bio-microscope which reveals, under the high-power field, the presence of areas on the cornea of opaque epithelial cells. We realize that this definition does not designate degrees of burn and we therefore readily accept the fact that we diagnose, no doubt, many burns that are actually only irritations, but by sad experience we have learned that in handling the highly complex organic chemicals, at times they do not react for hours after the initial exposure. Hours after a burn is too late to produce clinical results by treatment; so all parties concerned accept this flaw as a righteous error on the side of saving vision.

The technic followed in my practice is as follows:

(1) *First Aid.*—Each employe in a chemical plant is required, in his orientation lectures, to learn that exposure to a chemical should be immediately treated by copiously flushing the eye with ordinary tap water. This may be done by using any of the commercial fountains now on the market, designed for this purpose, or a very simple fountain may be made by any plant if it is so constructed that the water is controlled by foot pressure or is a constant stream. The water should bubble up high enough to reach the eye easily and the opening should be capped with soft rubber so that no additional injury to the eye is produced by contact with metal. Five minute washing is advisable and following this the patient should proceed at once to the dispensary for further care by the plant nurses and doctor or by the trained first aid staff. It is important that no neutralization of the chemical be attempted at any time, for we have proven this to be unsatisfactory and in some cases to be actually harmful.

(2) *Dispensary Treatment.*—The injured eye should be anesthetized at once with a non-narcotic local anesthetic. We prefer pontocain® because of its hardening effect on the corneal epithelium. As soon as pain and blepharo-spasm is controlled, 2 per cent fluorescein is applied and the eye is flushed with saline. The eye is considered to be a treatable injury if stain is retained. In these cases washing with a constant stream of saline at room temperature is begun and continued for fifteen minutes. The apparatus used is a simple bottle filled with sterile saline of from one to five gallon capacity, and fitted with a syphon. We place it three feet above the patient to deliver the proper force. Our original apparatus was set up by one of the chemists and I note in a recent publication that it now carries a name. It is of importance to use a tip of soft rubber so that no further injury is caused.

Following the first fifteen minutes of washing, stain is reapplied and flushed. If stain is retained, another fifteen minutes of washing is carried out. Stain is reapplied and flushed. This time if stain is retained we designate such an eye injury as a chemical burn of sufficient importance to be referred at once to the ophthalmologist for care. It is at this point in the care of chemical burns that we have received unfavorable criticism. We accept this. We shall, however, continue to diagnose on the safe side rather than to risk any loss of a function so important as vision.

Chemicals are being used more and more in the home and in other places away from controlled first aid. Accidents of this type burden the ophthalmologist with additional responsibility, for he must, under these conditions use his ingenuity, and it requires of him promptness in administering treatment. The first aid rules set forth above are, of course, ideal but cannot always be applied.

(3) *The Ophthalmologist's Care.*—Patients with chemical burns arriving at the ophthalmologist's office are selected by the first aid personnel of an industrial plant by the sole criterion of the eye's retaining stain after thirty minutes of washing. Each patient is handled as an emergency case and is given preference to all other cases in the office. A short but complete history is secured by the office secretary so that compensation reports may be properly made. During the history taking, the office nurse restains the eye with the usual routine of anesthesia and fluorescein. The eye is then examined grossly with the loupe and then in detail with the bio-microscope. It is true that a diagnosis may be made without the microscope but careful examination with it allows the operator to denude the cornea only to the extent needed. It seems to me that disregard of the use of the bio-microscope

places the ophthalmologist in the class of a non-specialist or a careless operator who pays more attention to "getting by," than to giving the best possible treatment.

We have proven that most chemicals of the organic class, many of the inorganic class, and the alkalies, act very slowly on the eye. In the early hours of the exposure these chemicals are adsorbed on the epithelial cells of the cornea and conjunctiva and therefore may be removed mechanically before harm is done. Your attention is called to the fact that all epithelial cells of these structures are replaced, in kind, very rapidly, by sliding of the remaining cells on Bowman's membrane and by mitosis. Structures below the epithelium, beginning with Bowman's, are replaced by scar tissue, which is, of course, opaque. Therefore, we remove the affected cells by wiping with a dry cotton swab, but only to the depth indicated by the previous examination with the slit-lamp. This removal of cells, for lack of a better term, we have called denuding. One could call it debridement but to us that is a more traumatizing procedure to be avoided in these cases.

Acid burns, such as by hydrochloric and sulphuric, are quite different from the more slowly acting chemicals mentioned above. Their action is rapid and complete long before first aid can be administered. In these burns a simple removal of the damaged tissue is advised and here again is a mechanical abrasion to heal, the results depending upon how deep the acid penetrated before it used itself up.

We use a round toothpick wound with dry cotton in the form of a swab and apply this sterile swab with just enough pressure to distort the cornea slightly, wiping with a circular motion from the center to the limbus. The conjunctiva should be wiped in its entirety, with emphasis to the lower and upper palpebral conjunctiva and caruncle, because of the formations of symblepharon if they are insufficiently denuded.

When the chemical burn has been properly denuded the actual result is that the eye injury has been converted from an extremely dangerous one to a mechanical one. The transposition is done under surgical asepsis and we now have a simple abrasion to guide through its healing period.

All authorities seem to agree that the preceding steps in the treatment of a chemical burn are acceptable. There is, however, some discussion as to the use of certain drugs in the healing period of the burn. One drug is advertised highly as having extraordinary value in not only neutralizing any chemical but also in promoting rapid healing. My experience has not confirmed this claim. In fact, after speaking on this subject to many different groups in the past five years, I am inclined to believe it would be presumptuous to advise any of this group on how best to encourage healing with a minimum of scar formation and pain. It is my firm belief that convalescence from this injury is an individual problem in each case and that the ophthalmologist must concern himself with the various complications of focal infection, external infection, cooperation of the patient, pain-threshold, and the myriad other problems with which we are all familiar.

In my series I have noted, but disregarded, focal infection for the first 48 hours. If healing by first intention does not take place, then intensive treatment of foci is instituted. Control of pain is achieved by local anesthetic ointment and general sedation. Dressings are kept on the injured eyes with moderate pressure. This helps to control pain.

Complications in the form of ulcers have been treated with methylene blue and the usual antiseptics. I have not yet used topical cortisone but I plan to do so with my next case.

Healing takes place following the majority of chemical burns within a few hours to a few days depending upon the severity of the burn and the depth of denuding. Complicated cases, of course, require longer periods of time, depending upon the complication and the general physical condition. Mydriatics are avoided except on specific indication. We have never used them as a routine because of the disabling loss of accommodation in the rapidly healing cases. After healing, visual acuity and final slit-lamp examination are done in all cases to reveal the presence, if any, of opacities of the cornea. We have used choline chloride for these rare opacities with a considerable degree of success. A one per cent solution every three hours during the day is the most effective when used as drops. The medication is continued for as long as vision continues to improve.

The treatment outlined above has resulted in an ideal method of handling a serious accident now prevalent in industry and in the home.

PRACTICAL THERAPEUTICS IN OTOLARYNGOLOGY*

By WILLIAM C. WARREN, JR., M.D.†
Atlanta, Georgia

In attempting to evaluate therapeutics, as far as results to my patients are concerned, the first thing that comes to my mind is cauterization of the inferior turbinates. I have resorted to many methods for carrying out this procedure, but shall give the details of only one. This, of course, has been the best in my experience. I am speaking of the use of concentrated nitric acid, streaking the turbinate from back to front while the patient holds his breath; using a metal applicator with a small amount of cotton wrapped tightly, and being sure that all excess acid has been removed. The size of the turbinate and the amount of redundant tissue determine the extent of cauterization.

In patients who need the above treatment it is well to keep in mind the possibility of the presence of posterior tips that might be contributing to the nasal obstruction. These are removed by the use of a wire snare. One can carry out both procedures at the same time under proper local anesthesia. I personally prefer the topical application of 10 to 20 per cent cocaine solution.

The use of 6 per cent silver nitrate in the nasopharynx ranks second in importance. I should say that at least 75 per cent of the sore throats that I come in contact with are in this region and present a typical history, that is: extreme soreness especially in the middle of the night and early morning, the soreness disappearing around noon but recurring the next night and morning, accompanied by a tickling or scratchy sensation, a desire to swallow and clear the throat frequently plus general debility. In many cases examination reveals little. The acute condition will clear up beautifully after one, two or three treatments. Again make certain that all excess of the solution is removed from the applicator, because a drop or two into the larynx will produce a severe spasm.

Dilatation and inflation of the ears presents a controversial subject, but this treatment has afforded my patients much relief over a period of years, and I shall always use it. I have literally hundreds of patients who would be willing to write me a testimonial to this effect. The former is resorted to only in conditions of long standing, and the procedure is carried out twice weekly.

Shrinkage and suction in the treatment of sinus disease rank foremost with me, and to irrigate an antrum I have discarded every method except one: the use of an 18-gauge spinal puncture needle underneath the inferior turbinate. This is such a simple procedure that I see no reason to employ the normal ostium approach. Always keep in mind that in obstinate acute frontal sinus cases the infraction of the middle turbinate may work a miracle.

External otitis in one form or another is quite common, and its treatment in many cases taxes one's ingenuity. I have used vinegar of cantharides, iso-par ointment, aluminum citrate 6 per cent, or Burrows' solution, and furacin ointment and solution to equal advantage. For those cases presenting the predominating symptoms of scaling and itching, I prefer local applications of vinegar of cantharides. This is a powerful drug and must be used sparingly. Overuse will cause blister formations. It should be applied only by a physician and twice weekly at the most. For the weeping type of external otitis, I pack the ear canal with one-half inch gauze strip (plain) impregnated with iso-par ointment, furacin ointment or sulfathiazole ointment (5 per cent), allowing the packing to stay in from 24 to 48 hours, and replacing it as often as necessary. For extremely inflamed conditions I use some form of Burrows' solution locally: either aluminum citrate 6 per cent (aluminum citrate crystals, 27 grains to ounce makes 6 per cent; dissolve in hot water and shake well), or modernized Burrows' solution, a tablet plus 1 pint of plain water. For pyocyaneus infections of the external canal, acetic acid 1 to 5 per cent will produce the best results.

I am still of the opinion that Sulzberger iodine powder, both strong and weak, has a definite place in the treatment of chronic ears. Some of the results obtained prove to be quite startling.

The use of phenol, on an applicator just barely covered with cotton, for opening furuncles of the nose and ear has been most satisfactory in my hands. It acts equally well as an anesthesia and antiseptic.

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*Read in Section on Ophthalmology and Otolaryngology, Southern Medical Association, Forty-Fourth Annual Meeting, St. Louis, Missouri, November 13-16, 1950.

†Professor of Otorhinolaryngology, Emory University School of Medicine, Atlanta, Georgia.

Nasal hemorrhages, other than those from Kiesselbach's area, continue to give all of us much concern and cause many a sleepless night. Oxycel® has helped somewhat but still does not prevent us from having to pack the nose as of old, that is, one or both sides plus the use of a postnasal plug. I always saturate my nasal packing with sulfathiazole crystals, ointment or cream, 5 per cent, and at the same time give the patient some form of antibiotic to keep down infection, and to lessen the possibility of recurring hemorrhage.

The use of antibiotics in recent years has been wonderful for the patient, but quite depleting to the physician. Those which produce the best results at the present writing, as far as I am concerned, are: (1) penicillin G in aqueous suspension, 300,000 units per cc.; (2) sulfonamides, gantrisin,® sulfadiazine and others; (3) aureomycin and terramycin are used against gram-positive organisms and chloromycetin® against gram-negative organisms. Aureomycin and terramycin can be very toxic at times and therefore should be taken with milk. The use of aluminum hydroxide gel should be condemned because it inhibits decidedly the efficacy of the drug.

The use of radium in the nasopharynx is another controversial subject. Having been fortunate enough to secure excellent results in children, as well as adults, with a history of repeated attacks of acute purulent and serous otitis media, I feel that it should be recommended in this dissertation.

As to use of nose drops or sprays, I have about come to the conclusion that neo-synephrine® is the best for all purposes.

The extent of my practice in the field of allergy consists of classifying the diet: (1) foods causing a high percentage of allergic reaction; (2) foods causing an average percentage of allergic reaction; (3) foods causing a low percentage of allergic reaction. The 6 main groups of food which may produce allergic reactions are: (1) milk and milk products; (2) wheat and wheat products; (3) eggs; (4) shell fish; (5) chocolate; (6) nuts.

Antihistamines may play an important role, particularly in relieving mild attacks of asthma and in urticaria following reactions to penicillin therapy. Procaine hydrochloride crystals are useful in some stubborn asthmatic conditions. (Ounces 1, water 6 ounces. Use 1 or 2 three times a day in some stubborn asthmatic conditions.)

In mouths and throats with Vincent's infection and other conditions simulating it, I could never do without the use of bismuth salicylate with camphor and creosote, the dosage being a 1 cc. ampule given every day for 3 days and then every other day for 3 more doses if necessary. Usually the condition clears up after the first three injections.

THE EFFECT OF CORTISONE AND ACTH ON BACTERIAL INFECTIONS*

By MAX MICHAEL, JR., M.D.
Atlanta, Georgia

The spectacular results achieved with the use of cortisone and ACTH in patients with various collagen diseases have led to extensive trials of these substances in a variety of disease processes, unrelated etiologically or pathologically. Gratifying results have similarly been recorded in various allergic, cutaneous, neoplastic, and metabolic disorders. In contrast are the meager reports concerning the effect of these preparations on bacterial infections. This is probably wise, for not only may these substances have no beneficial effects on bacterial infections, but indeed they may actually be harmful. In considering this problem I should like to analyze, insofar as possible, first, the factors which aid the body in its fight against bacteria, and second, the ways in which cortisone might alter these defenses.

The initial response of the host to many bacterial infections, which is analogous to the response to injury, includes the following: first, there is capillary dilatation, the degree depending upon the nature of the stimulus. Simultaneously, there is margination of polymorphonuclear leukocytes in these capillaries and then a migration of the polymorphonuclear leukocytes to the site of the infection. These cells attempt to ingest and to dispose of the noxious agent. Early in the course of the inflammatory process

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an edema fluid, rich in protein, is poured out. This fluid contains, among other things, antibodies which may be useful in combatting the infection and fibrin which may aid in localization of the process and hamper further spread throughout the body. The mononuclear phagocytes, derived from tissue and blood cells, soon make their appearance to ingest the bacteria and necrotic tissue, and in general to clean up and rid the body of the infection. New blood vessels accompanied by young fibroblasts growing into the site of infection serve to throw up an inflammatory barrier and, later, a fibrous barrier around the focus. Thus, it can be seen that the body's defense against the offending bacteria revolves around attempts to localize, to prepare for phagocytosis by means of antibody, to phagocytose and destroy the noxious agent and to limit spread by, first, an inflammatory barrier, and in many infections later by a fibrous barrier. This somewhat simplified description of the course of events indicates to us that the body's struggle against bacteria is somewhat analogous to certain military tactics: to delay, to surround, to engulf, and to liquidate. How, then, can cortisone alter this orderly response? Let us go through the inflammatory process and indicate where cortisone might have actions.

As indicated previously, the initial response is an acute inflammatory reaction with dilatation of blood vessels. Our preliminary studies have indicated that cortisone does delay this initial vasodilatation and accumulation of polymorphonuclear leukocytes.[1] In these studies, we have used croton oil, an irritant which produces a response similar to that evoked by most bacteria. When this substance is placed on the scarified skin of a rabbit, an intense inflammatory reaction, manifested by edema and redness, appears within a few minutes and progresses to spreading necrosis within 48 hours. On the other hand, the same agent applied to rabbits that have been receiving cortisone results in only a mild erythema which subsides in 96 hours without necrosis. Histologic sections taken 30 minutes after application of the oil demonstrate the almost complete absence of capillary dilatation in the cortisone treated animals as contrasted with extreme engorgement and dilatation of capillaries in the untreated group. Moreover, in the control animals, at this stage the leukocytes have marginated to the capillary walls in preparation for migration into areas of tissue damage, whereas in the cortisone treated animals margination is much less obvious. Later sections reveal that essentially the entire inflammatory process is retarded quantitatively by cortisone administration. Therefore, this earliest defense against infection, the acute inflammatory reaction, is suppressed by cortisone. Whether this is a harmful feature will depend upon further studies.

The edema fluid in lesions of the cortisone treated animals was noted to be less in amount during the period of the above study. As mentioned previously, this edema fluid is rich in substances aiding in localization and phagocytosis of the offending bacterial agent. Another feature to be reckoned with is the possible effect of cortisone on protein stores in the body. Its protein anti-anabolic effect is well known, but the mechanism of this and the extent to which it may operate locally is not well understood.[2] The depletion of protein stores seems to alter unfavorably the body's defense against infection in ways not clear at present.[3] It is not possible or profitable at this stage of our knowledge to go further into this possible deleterious effect of cortisone on the inflammatory reaction.

The effect of cortisone on the macrophage is not completely clarified. There is, apparently, no profound depression of these cells as there is of lymphocytes. Actually, they seem in some instances to be increased in numbers at the site of an inflammatory reaction when the subject is receiving cortisone.[4 7] The functional status of such macrophages is open to question. Studies of Gordon and Katsch[5] showed an increased avidity of macrophages for thorium dioxide under the influence of adrenal cortical extract, whereas the observations of Spain *et alii*[6] seem to indicate decreased functional activity of the macrophages of mice receiving cortisone. Thus far, it can be said that the structure, number, and function of the tissue macrophage may not be profoundly altered by cortisone.

As mentioned previously, the reparative process of acute inflammation and, similarly, of most bacterial infections, begins rather early with the appearance of new blood vessels, fibroblasts, and intercellular matrix, the so-called granulation tissue. It has been shown conclusively by several investigators that cortisone suppresses granulation tissue, both qualitatively and quantitatively.[6 7 8] New capillary formation is scanty, ground substance is small in amount and fibroblastic proliferation is at a minimum. Cer-

tainly, in the healing of infections in which such granulation tissue and fibrous tissue walling off is a necessary part of defense, cortisone would be expected to exert a deleterious effect.

Another feature in the body's defense against infection is concerned with the somewhat esoteric term, natural resistance. This phase refers to the marked differences in the susceptibility of man and animals to various infections. As an example, one could cite the resistance of mice to infection with group A beta hemolytic streptococci or the Negro's apparent susceptibility to, and poor defense against, tuberculosis. Studies in our laboratories on the resistance of the albino rat to tuberculosis are of interest along these lines.[9] When this animal is infected with virulent human tubercle bacilli, it responds with a non-fatal granulomatous lesion which heals uneventfully. Actually, in some strains, no lesions are produced and the organisms can be recovered from tissues and blood as long as 120 days after infection. When these animals are given cortisone and then infected, an entirely different picture ensues. Over 80 per cent of the rats die within 6 weeks of widespread tuberculosis with no attempt at localization or healing. In a manner not at all clear at this time, the natural resistance of the animal against tuberculosis has been completely broken down by cortisone. Similar findings have been reported by Hart in mice resistant to tuberculosis.[10] These experiments are cited to point out that in instances where natural resistance, mysterious as it may sound, has helped protect the individual against infection, cortisone has broken down these natural defenses. We are all constantly exposed to a variety of bacteria, and, indeed, harbor many of them in our body. A state of symbiosis has been reached wherein we furnish metabolites for the bacteria, but are not harmed by their presence. Our immunity in some instances is acquired. We have had previous experience with the agent, either by immunization, by subclinical infection, or by actually having had the disease. But in most instances, the immunity is natural: natural resistance. As examples, one could mention the relatively high percentage of carriers of meningococci and of pneumococci without harmful effects. Whether cortisone in sufficient dosages can break these defenses in the human as it does in the experimental animal will remain to be seen. We should guess that it can.

What, then, are the clinical implications of these experimental observations? The orderly process of protection against bacterial infection seems to be inhibited by cortisone. Similarly, the natural resistance of the experimental animal to various infections appears to be suppressed. One could postulate that cortisone might influence in an unfavorable fashion the outcome of infections in man, and might make him more susceptible to infections to which he has a certain amount of natural resistance. Are these conjectures true? We believe they are and will cite the following isolated observations to substantiate this thesis.

Perera[11] recorded the instance of a patient who, after having received cortisone for 27 days, developed a furuncle that rapidly spread showing sloughing, failure to heal, and discharge of thick, purulent material in spite of local application of penicillin and bacitracin ointment. Six days after the steroid was stopped, healing occurred at a normal rate. A patient under our observation had had recurrent furuncles scattered over his body for a number of years. All of these had either resolved or drained spontaneously, and had healed without benefit of chemotherapy or surgical drainage. While he was receiving cortisone, he developed, on the chest wall, a furuncle that spread diffusely into the axilla. Only after surgical drainage and penicillin therapy, did the lesion subside. In these instances, then, it would appear that the inflammatory barrier and wall of fibrous tissue were inhibited and the infection allowed to spread.

The increased sense of well-being experienced by patients receiving cortisone, along with the diminution in signs of inflammation, and the non-specific temperature lowering effect may mask the usual signs of infection and cause severe infections to progress unrecognized. Recently, we were chagrined to have the pathologist show us classical pneumococcal pneumonia at the autopsy of a patient who had been receiving cortisone for two weeks for multiple myeloma. He had been afebrile and examination of his chest six hours before death revealed nothing more than the basilar rales he had during his entire hospital stay. A similar set of circumstances occurred in a patient studied by Armstrong.[12] This elderly woman was receiving ACTH for mycosis fungoides. Autopsy disclosed a purulent pericarditis due to Staphylococcus aureus that was unrecognized during life. Beck[13] and his co-workers have described two patients

who developed peritonitis during treatment with ACTH. The absence of abdominal rigidity and fever made the diagnosis difficult. This group of patients emphasize the fact that bacterial infections can be overlooked because of the absence of the usual local and systemic signs of infection as a result of cortisone therapy. Undoubtedly, in such circumstances the lowering of the natural defensive barriers are partly to blame.

Fragmentary reports indicate similar untoward results in patients with well-established infections. Finland[14] and his collaborators have described a patient who was given ACTH for classical lobar pneumonia due to type VIII pneumococcus. The temperature had reached normal within 12 hours after the start of ACTH therapy. However, a blood culture taken at this time was positive for the causative organism in spite of a negative culture at onset of the disease. Similarly, a blood culture was positive 24 hours after the temperature had reached normal. The patient did well and had no spread of his pneumonia. Of interest is the fact that the sputum specimens taken at the time of the positive cultures were loaded with pneumococci and there was no evidence of phagocytosis in the smear. The feature of note is a positive blood culture in the face of a normal temperature and a sense of well-being. Fortunately, this patient was not harmed, but the implications of these findings are obvious.

In those patients with pulmonary tuberculosis treated with cortisone or ACTH, the impression has been gained that, in spite of diminished fever, return of appetite and loss of malaise, the disease had begun to spread. In particular was spread noted after ACTH was discontinued. Laryngeal lesions did appear to diminish in size while therapy was continued.[15,16] It is probable that this represented only the suppressive effect on the abundant granulation tissue and edema present in such laryngeal lesions.

SUMMARY

We believe that the following is to be learned from the facts presented. Cortisone and ACTH may profoundly alter the body's reaction to a variety of bacterial infections. Such changes are brought about by certain well-documented actions of these hormones. Among these are: (1) delay and inhibition of the initial inflammatory response; (2) delay and inhibition of formation of granulation tissue; (3) ability to break down natural resistance; (4) ability to suppress the usual clinical signs of inflammation, making recognition of infection difficult. Thus, to the harmful side effects of cortisone and ACTH, such as psychoses, water and electrolyte retention, hyperglycemia, and hypokalemia must be added the enhancing effect on bacterial infections: the effect of causing infection to spread, of causing it to be unrecognized, and of breaking down the protective mechanism of natural resistance.

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SKIN CANCER*

A ONE-YEAR SURVEY IN PRIVATE PRACTICE

By JAMES G. THOMPSON, M.D.
Jackson, Mississippi

The paper, "Skin Cancer: A Ten-Year Survey in Private Practice," read before this section in 1948, caused considerable concern in my mind, in that the survey covered 3,331 cases diagnosed as skin cancer with relatively few biopsies. This dearth of biopsies brought less criticism from the

*Read in Section on Dermatology and Syphilology, Southern Medical Association, Forty-Fourth Annual Meeting, St. Louis, Missouri, November 13-16, 1950.

members of the section than was expected, but it continued to irritate the writer and he resolved to determine as nearly as possible how closely a clinical diagnosis of skin cancer made unaided and without benefit of consultation with anyone, could compare with the diagnosis of competent general pathologists. Three general pathology laboratories operated by three different pathologists were employed to make the diagnoses. A year was considered long enough to get a general idea about this problem. The year surveyed was from November 1, 1948 to November 1, 1949. No attempt is made in this paper to evaluate percentage of cures or to come to any other definite conclusions with regard to treatment. Some sidelights are brought out in comparing some of the percentages that differ in these two papers.

In the year considered a total of 2,123 new patients was seen, with 502 diagnoses of cancerous or precancerous lesions. This is a ratio of 1 out of 4 as compared to the ratio in the former paper of 1 out of 8. There were three groups not considered as cancerous. One was seborrheic keratosis of which there were 15 clinical diagnoses made with 9 biopsies, the biopsy reports being: seborrheic keratoses 7, senile keratosis 1, squamous cell carcinoma, grade I, one. The correct diagnosis with regard to biopsies made in this instance was 7 to 9. The second group was senile keratosis of which there were 69 clinical diagnoses made with 25 biopsies, the biopsy reports being: senile keratoses 18; squamous cell carcinoma, grade I, one; squamous cell carcinomas, grade II, 2; seborrheic keratoses 4; verruca vulgaris, one. The correct ratio in this instance was 18 to 25. The third group was leukoplakia, of which 7 clinical diagnoses were made with 5 biopsies. The pathologist reported 4 of these as leukoplakias and one as squamous cell carcinoma grade I. The ratio here of correct diagnosis was 4 to 1.

In the true skin cancer group there were 212 clinical diagnoses of basal cell carcinoma with 99 biopsies. The pathologist reported 60 basal cell carcinomas, one baso-squamous cell carcinoma, 20 squamous cell carcinomas, 3 seborrheic keratoses, 10 senile keratoses, one verruca vulgaris, one squamous cell papilloma, one sebaceous cyst, one adenoma sebaceum, and one pigmented nevus. The correct diagnosis in this instance was 60 to 99.

Cornu cutaneum, which the writer has always considered squamous cell, was diagnosed clinically in 26 cases with 15 biopsies, and the pathologist reported 2 cutaneous horns, one basal cell carcinoma, 2 squamous cell carcinomas grade I, 6 squamous cell carcinomas grade II and 4 senile keratoses. The percentage in this instance would be rather difficult to figure inasmuch as the pathologist reported 2 cutaneous horns and 4 senile keratoses with 1 basal cell carcinoma. Personally, it is my impression that all cutaneous horns should be considered as squamous cell carcinomas in spite of the fact that there may be some difference of opinion as to whether the horn is growing out of a senile keratosis or some characteristic about the base of the horn makes it appear basal. However, the pathologist did report one basal cell carcinoma in this group of 15 cutaneous horns.

There were 162 squamous cell carcinomas diagnosed clinically with 95 biopsies. The pathologist reported: 61 squamous cell carcinomas, 17 basal cell carcinomas, 4 baso-squamous cell carcinomas, 3 leukoplakias, 2 seborrheic keratoses, 6 senile keratoses, one probable fibroma and one epidermal inclusion cyst. To be meticulous about this group, one would have a ratio of 61 to 95; however, I feel that anyone may be excused as far as baso-squamous cell tumors are concerned, and that the writer should have a ratio here of 65 to 95, since a mixed tumor could be considered as squamous cell carcinoma.

Out of these 502 cases, 10 malignant melanomas were diagnosed and confirmed by biopsy.

There are several conclusions that can be reached, none of them new or startling: one is that the correct diagnosis of skin cancer covering any and all types of lesions that come into one's office higher than 6 to 9, or roughly 2 out of 3, as far as the writer is concerned, is practically impossible. Realizing fully that 502 cases are not many upon which to base such a statement, I feel that the fact that this number turned up almost the same in the two principal groups with which the paper is concerned proves something. I also feel that as far as the diagnosis is concerned, no pressure was exerted upon the writer in any direction, these diagnoses being made in a busy office after each lesion had been carefully examined with a loupe and after the history had been carefully taken.

In the previous paper over a ten-year period, among 25,000 new patients, 16 malignant melanomas were diagnosed. In this series covering

2,123 new patients, 10 malignant melanomas were diagnosed. This would make a ratio of 1 to 208 whereas in this series of 502 cases, the ratio is approximately 1 to 50. This is an amazing fact to me and I am still wondering how it happened. The ten malignant melanomas were proved by biopsy.

In addition to the 248 biopsies that were done on lesions that were thought by the writer to be either cancerous or precancerous, there were 86 lesions biopsied because the patient feared that he or she had cancer. These lesions were non-malignant and are not included in the group mentioned above.

Some of the impressions gotten from this short survey that are not brought out by the facts and above comments, are that lesions seen today are much smaller than lesions seen several years ago. Almost all of the larger lesions, relatively speaking, seen by the writer today are in persons in very low income groups who are the least informed, not only about cancer but about other things as well. The greater number of these patients are sent in for treatment by the local cancer clinic. It seems that in spite of all the information and education along this line that has been done in recent years, some of it has not reached all of the population.

Another impression is that an understanding and an appreciation of the danger from moles which are left in areas subjected to trauma over a considerable period of time is becoming more and more prevalent. This particular fact may account for the high percentage of malignant melanomas encountered in this relatively small series of cases. It is not the writer's impression that melanoma has become more prevalent recently, but that the index of suspicion has become much higher than formerly. It is observed also that very few people at present retain the fear that they formerly had of having a skin cancer treated or having a mole removed.

SUMMARY AND CONCLUSIONS

(1) Among 2,123 new patients seen in private practice over a period of one year, the diagnosis of 502 cancerous or precancerous lesions was made, a ratio of one to four as compared to one to eight in the previous paper of 1948.

(2) Eighty-six biopsies not included in this series were made on lesions not thought to be malignant by the writer, but thought to be cancers by patients concerned, a ratio of 1 to 23. This number was negligible in the previous paper, but was increasing in the last years of the previous ten-year survey.

(3) Correct diagnosis was made in roughly only 2 out of 3 cases clinically, assuming that the pathologic diagnosis is correct. Approximately half of the malignant lesions were biopsied.

(4) In the previous paper 3,331 skin cancers were diagnosed and out of this number 2,742 were diagnosed as basal cell carcinomas and 589 as squamous cell carcinomas. This represents a ratio of 4.66 basal cell carcinomas to 1 squamous cell carcinoma. In this paper 212 basal cell carcinomas were diagnosed clinically and 162 squamous cell carcinomas, a ratio of 1.4 to 1. The biopsy reports confirmed 60 basal cell carcinomas and 65 squamous cell carcinomas, a ratio of 0.972 to 1.

(5) Ten malignant melanomas were diagnosed among 2,123 patients, a ratio of 1 to 50. The ratio in the former paper was 1 to 208.

(6) Patients are becoming more cancer conscious, but there is need for further education and information.

DISCUSSION (*Abstract*)

Dr. J. Frank Campbell, Fort Worth, Tex.—Dr. Thompson is to be commended for his courage in making this survey. Most of us would not want to risk our reputations by pitting our clinical diagnoses against laboratory confirmation. I cannot remember that such a survey as he has made has been done previously.

From this survey, we can see that we should not depend entirely upon our clinical judgments in the diagnosing of skin cancers. There will be many keratoses that will have just begun to break down into a skin cancer; also, those on the back of the hands are particularly confusing due to the fact that some of the most vicious looking lesions here turn out to be only keratoses.

I have used a method which is useful in determining whether a keratosis should be sent to the laboratory. After anesthesia, a ring curette is used to determine the depth of the lesion. If the curetted specimen is one or two millimeters in thickness, then that lesion, I think, should go to the laboratory. It keeps from having a disfiguring scar frequently in taking our biopsy.

Before I knew the type of survey that Dr. Thompson was going to make, I tried to anticipate him by pulling from my records 100 consecutive cases of skin cancer which had been diagnosed by biopsy. These were pulled from the middle of my files, in the L's and M's, in an attempt to be as nearly in the center as possible. Many had had multiple skin cancers, and for that reason there are more diagnoses present than there are patients. You will note that there are about as many squamous cell carcinomas as basal cell tumors, which agrees with Dr.

Thompson's 60 of each, 60 basal cell and 60 squamous cell. Diagnoses (laboratory) in order of frequency:

Basal cell carcinoma	52
Squamous cell, grade 1	31
Squamous cell, grade 2	21
Mixed type	2
Carcinoma *in situ*	2
Melanocarcinoma	2
Pigmented basal cell	1
Hemangio-endothelioma	1
Squamous cell, grade 3	1
Paget's disease	1

I realize that this is of no value statistically, and yet it does show the great variety of skin lesions which may occur in 100 cases.

Dr. M. Allen Forbes, Jr., Austin, Tex.—A point that impressed me in Dr. Thompson's paper was the comparison that he made to his 1948 paper in regard to the ratio of cancerous and precancerous lesions to the total number of new patients over that period of time. In his previous paper, the ratio was one to eight, and in his present paper, the ratio was one to four. It seems to me that this can be explained by the fact that within the last few years people have become more cancer-conscious, probably due to the publicity that cancer is receiving.

I think, also, that the apparent increase in the number of melanomas, which he reported, in this series of cases is also due to the same factor. People are becoming more conscious, as you all know, becoming more worried about moles, than they have been in the past.

Also, since people are consulting physicians much earlier now than they did in the past in regard to lesions on the skin, this is going to make the clinical diagnosis much more difficult. However, I believe that Dr. Thompson has graded himself rather harshly in arriving at a figure of two out of three. In his series of 99 clinical basal cell carcinomas, there was a total of 81 carcinomas. Although 21 of them were squamous cell, he still diagnosed cancer in 81 of 99 cases; and in the series of 95 clinical squamous cell carcinomas, there was a total of 82 carcinomas, although 17 were basal cell and 4 were baso-squamous. Taking these figures, he diagnosed correctly a little better than 8 out of 10 carcinomas. I think that this is a very good percentage, as many times it is very difficult to differentiate clinically a basal cell from a squamous cell carcinoma and impossible to differentiate a basal cell from a mixed baso-squamous type. Therefore, I believe his average of correct diagnosis is much better than two out of three.

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ANOTHER EPOCH IN THE STUDY OF SHOCK

Progressive increase in our knowledge of the physiologic derangements in shock has been punctuated by the appearance of epochal monographs summarizing periods of intense investigative activity. These monographs have fostered an application of basic principles to the understanding and treatment of clinical problems. More importantly, such critical reviews have stimulated new investigation. A recent monograph[1] by Prof. Wiggers, Director of the Department of Physiology at Western Reserve, is in keeping with the fine tradition established by Cannon, Blalock and Moon.

Available for review and critical analysis are the experimental studies of shock undertaken during World War II. This most recent era of investigation of shock may be said to follow the publication of Moon's "Shock and Related Capillary Phenomena" in 1938. At that time, "the balance of evidence supported the concept that shock is initiated by a reduction in blood volume and that its progressive trend to an irreversible state is caused by continued leakage of plasma through capillaries." In 1943, Fine and Seligman, using tagged plasma protein, proved that plasma does not leak from capillaries away from the site of trauma. Other corroborative data soon appeared and it was realized that the progressive circulatory failure of shock could not be ascribed to a further decrease in blood volume. At about this same time, Wiggers suggested that the term "shock" be restricted to that state of circulatory failure wherein body functions cannot be stabilized by restoration of the blood volume to its usual level. This suggestion was opposed vigorously from all sides, but an ultimate compromise designated this final circulatory failure in the presence of a restored blood volume as "irreversible shock." It was Wiggers' presentiment that irreversibility was due largely to myocardial failure.

The standard experiment for the analysis of shock is one wherein blood is withdrawn from a dog to establish a mean arterial pressure of 50 mm. of mercury. This reduces the blood volume by about 30 to 40 per cent and probably approximates the amount of fluid replacement available as cells and plasma from the body. A second bleeding of 30 mm. of mercury reduces the blood volume to a critical level. Later re-infusion of all the withdrawn blood restores the blood volume and temporarily supports the peripheral circulation. Shock develops subsequently without significant reduction from the normal blood volume. It is with the elucidation of the causes of death in this "normovolemic" or "irreversible" shock that Wiggers' monograph is chiefly concerned.

The monograph reviews recent investigations in terms of the standard shock experiment. The critical analysis is brilliantly conceived and, at times, devastating. "Investigators who ought to know better continue to draw far-reaching conclusions from direct readings of right atrial pressure." The author has presented strong evidence that the terminal phase of normovolemic shock is characterized by a rapid decline in arterial pressure, a rise in effective venous pressure and progressive slowing of the heart. This is dis-

1. Wiggers, Carl J.: Physiology of Shock, 459 pages, with illustrations. New York: The Commonwealth Fund, 1950.

tinctly a cardiac phase of the circulatory failure and is not responsive to transfusion of blood equal to four times the normal blood volume. The concept that blood is sequestered or trapped by capillary pooling is endorsed. Metabolic changes seen in shock are thought to be the result rather than the cause of progressive circulatory failure. It is concluded that there is no clear experimental evidence to support endogenous toxins or neurogenic influences as contributory factors. Similarly, the liver, kidneys and adrenals are not felt to play a critical role in determining vascular responses during several types of shock.

Considerable evidence is presented that the late phases of shock are characterized by disorganization of the cardiovascular mechanism and redistribution of blood by capillary pooling. Wiggers concludes, however, that "It cannot be claimed that the effect of myocardial depression on circulatory failure is equally important in every case of shock." Challenging unsolved problems are listed, including: (1) better estimation of the relative importance of cardiac and peripheral factors in the progression of circulatory failure; (2) restudy of the basic dynamics of venous return; and (3) study of the mechanisms responsible for the peripheral vascular stasis and pooling of blood in shock.

Although there are many clinicians who will still feel that a study of "normovolemic" or "irreversible" shock is an analysis of the antemortem state and the mechanism of dying, this small volume is indeed an epochal contribution. Replete with clinically pertinent suggestions, it also defines avenues of productive laboratory and clinical investigation. It is heartening, indeed, that senior investigators are dedicating themselves to such arduous labors to blueprint future investigation as science moves into another era of centrally directed and coordinated research.

FERTILITY AND FOLIC ACID

Folic acid is in some way intimately concerned with the reproductive cycle and with maintenance of gestation. It has been noted that aminopterin, an antivitamin which counteracts the nutritional activity of folic acid, can cause abortion of early pregnancy in several species. Kline and Dorfman[1] at Western Reserve note that this material interferes drastically with the estrogenic effects of the female hormones in young animals. Folic acid deficiency, whether produced by dietary deficit or by feeding aminopterin, interferes with the usual stimulating reaction of the estrogens upon the chick or mouse oviduct. Normally the oviduct of the young chick increases rapidly in size following administration of stilbestrol or other estrogens. In folic acid deficiency, the response is greatly diminished.

From this work, it would appear that folic acid is as important in reproduction as is vitamin E, the fat-soluble so-called fertility vitamin. During vitamin A deficiency, implantation of the fetus does not take place. During vitamin E deficiency, the implanted embryo is rapidly resorbed. Other undesirable effects of deficiency of this food factor are perhaps slow in appearing, and this is the reason why vitamin E seemed to early workers to be needed for maintenance of normal animals only during the reproductive phase. Actually a milder vitamin E deficiency which permits maintenance of gestation is reported to cause various specific developmental defects. Muscular abnormalities have been reported, and more recently several typical ocular disturbances. The eyeballs of young rats whose mothers were maintained on a ration inadequate in vitamin E were smaller than normal; the eyelids failed to open, and an opaque white membrane was visible behind the pupil in a number of instances.[2] Heavy dosage of premature infants with vitamin E is reported to be beneficial to normal development of the eye.

The physiologic importance of folic acid, of course, was first noted in therapy of pernicious anemia, where it is potent in permitting maturation of the erythrocytes in the bone marrow. In laboratory studies on small animals it is shown to be concerned in maintenance of reproductive function. There is actually no such thing as a fertility vitamin.

In cases of vitamin shortage, no doubt many substances for the embryo are obtained by robbing the maternal tissues.

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POVERTY AS A DISEASE

The question, "Does failure run in families?" is one of those which has been recently studied from a psychiatric viewpoint. Massachusetts workers[1] have investigated the subject of poverty, using as their human material the inhabitants of an almshouse. They call their work the study of one thousand unsuccessful careers.

Residence in an almshouse should be an unequivocal objective criterion of failure in life's adjustments, since few wish to end their lives in a place so-called. The origin of the inmates, their early family life, social and financial condition of parents, brothers and sisters were ascertained in so far as they could be traced. Data were secured to compare the almshouse group, their brothers and sisters, and the general population of Massachusetts, in educational record, social service history which included the number who had been arrested or who had been recipients of state charity, skills and earning ability, family size, marital and alcoholic history.

Among the inmates were an excess of immigrants and of persons with a deficit in formal education, in occupational skill and also in marital success. As the size of the family increased, the number of children with probation records increased, possibly due to economic pressure, undoubtedly an argument for extension of the activities of the maternal welfare associations. The inmates had a little less schooling than their brothers and sisters; and their brothers and sisters had less than the average for the State of Massachusetts.

A large number of the almshouse group were single. Sixty-seven per cent of them had been arrested during their careers while only 13 per cent of their siblings had come in conflict with the law. Alcohol seemed to be a significant factor in failure. Inebriety was the most important single social problem among both inmates and their siblings. The group of alcoholics, it is commented, generally contains more single persons than does the nonalcoholic group. Parents and siblings of the almshouse inmates had better jobs than the patients had held.

The investigators consider that the study reinforces the hypothesis that failure to get along in society is a behavior disorder and requires individual rather than social therapy. They gathered no evidence to show that it is an inherited tendency. A familial pattern of arrests and dependency was rarely observed. The siblings of the almshouse group seemed better adjusted throughout life. They went to school longer; they were more successful in marriage; they held jobs which required more special skills. The devastating effect of alcoholism in causing failure was an outstanding feature of the study. The Massachusetts workers conclude that only through programs involving the concept of personality disorder and its individual treatment can failure be dealt with. Thus poverty, an inability of the individual to adjust normally in society, may constitute a new syndrome among the psychiatric disturbance.

1. Ullman, Albert D.; Demone, Harold W., Jr.; and Stearns, A. Warren: Does Failure Run in Families? A Further Study of One Thousand Unsuccessful Careers. Amer. J. Psychiatry, **107**:667 (March) 1951.

TWENTY-FIVE YEARS AGO

From Journals of 1926

Treatment of Malignant Growths with Colloidal Lead.[1]—Coincident with the visit to this country from England of W. Blair Bell, much attention has been directed to his experimental work upon the effect of intravenous injection of colloidal lead upon malignant growths. . . . It has been shown by Bell that chorionic tissue and tumor tissue absorb lead from the blood stream selectively and more rapidly than other living tissues, and are then destroyed by the absorbed lead. . . . The first case was treated nearly six years ago, and in all now 227 patients, usually in hopeless stages of the disease, have received injections. . . . Dr. J. G. Adami, the distinguished pathologist, commenting upon Dr. Bell's "cured" cases, many of whom he has observed from the beginning of treatment, notes the healthy appearance of the majority of them, the absence of cachexia, absence of signs of lead poisoning, the improvement in weight and bodily condition of the patients and their ability to engage in active occupations. . . . The mortality of sixty per cent he says, is to be considered as a material reduction from a mortality of, say, ninety-five per cent. . . . The research is of value at present not primarily clinically but for the light which it sheds upon tumor chemistry. Normal and malignant tissues have been shown to differ in their sugar content, in their enzyme content, in their content of a growth-stimulating principle, in the rapidity with which they absorb x-ray and radium emanation and colloidal lead.

Milk.[2]—Twenty-five years ago the dairy industry was to a great extent dependent upon soil, seasons and climate. Today scientific dairying has freed itself from these. . . . The average producing dairyman is poorly equipped by education, by experience or by ideals to perform his task properly. Generally he has drifted

1. Editorial: Treatment of Malignant Growths with Colloidal Lead. Sou. Med. J., **19**:410 (May) 1926.

2. Durrett, J. J.; and Isley, C. L., Jr.: Some Problems of Milk Production in the South. Sou. Med. J., **19**:438 (June) 1926.

into dairying. . . . If he owns his own farm, as one-half of them do, he will remain in the business more than twice as long as the renter. Two out of three move once each four years, and two raise no feed or calves. . . . He . . . knows next to nothing about costs, bacteria and the requirements of the ordinance under which he operates.

His farm has 68 acres of land, is located ten miles from town and he travels thirty miles per day over his route, delivering thirty-eight gallons of milk drawn from twenty milking cows in a herd of twenty-five and, with luck, collects a maximum gross income of $22.80 per day. From this sum he must manage to pay all his bills, rents and depreciation. . . . The average milk dealer will purchase any quality of milk offered for sale from any source at the lowest cost. Such milk will be passed through a dirty pasteurizing plant . . . with inadequate control of the heating and cooling processes.

Radiopaque Oil.[1]—Iodized oil . . . was first employed by Sicard and Forestier in 1921 as an aid in locating and demonstrating obstructions of the spinal canal, and later . . . in . . . the pulmonary tissues. . . . The therapeutic use of iodine is not new but this compound of iodized oil is a new combination, and, as a result of the slow liberation of the iodine in the bronchial tree, acts as an ideal treatment in chronic affections of the lower respiratory tract.

1. Pritchard, Stuart; White, Bruce; and Gordon, J. K. M.: Use of Iodized Oil in Diagnosis and Treatment of Bronchial Affections. J.A.M.A., **86**:1119 (April 10) 1926.

Medical Education

REPORT OF COMMITTEE ON MEDICAL EDUCATION OF SOUTHERN MEDICAL ASSOCIATION

A meeting of the Committee on Medical Education of the Southern Medical Association was held on November 12, 1950, at the Hotel Jefferson, St. Louis, Missouri. Dr. R. Hugh Wood, Chairman of the Committee and Dean of Emory University School of Medicine, Atlanta, Georgia, presided. Other members of the Committee present were: Dr. Waverly R. Payne, Newport News, Virginia; Dr. W. Kendrick Purks, Vicksburg, Mississippi; Dr. Milford O. Rouse, Dallas, Texas; Dr. R. L. Sanders, Memphis, Tennessee; and Dr. Walter E. Vest, Huntington, West Virginia.

Dr. Wood, for his committee, made the following report to the Council which was unanimously approved by the Council:

TOPICS DISCUSSED AND ACTION TAKEN BY THE COMMITTEE

(1) *Public Misunderstandings*

It was agreed that a matter of first importance was the necessity of public information to dispell the most prevalent misconceptions concerning several aspects of Southern medical education.

Many of the Committee members have observed that educated laymen and even practicing physicians feel that there is an unnecessary limitation of the number of medical students accepted into our medical schools. Some laymen believe that the American Medical Association and the Association of American Medical Colleges are in some sort of unholy collusion to limit the number of doctors. Many people are of the opinion that the schools could double their enrollments if they cared to, not realizing that very often medical school budgets are already strained to the breaking point and doubling the student body means increased facilities, budget, and teaching personnel. They do not understand the scarcity and difficulty of finding well-trained personnel to staff the medical school even when funds are no problem.

Many believe that the tuition fee meets a large part of the cost of educating the student, whereas in the entire 79 medical schools throughout the country it covers only 22.8 per cent of the total cost. The Association of American Medical Colleges' report of 1950 gave the average tuition fee for 1950-51 as $554 and the average cost to the school per student as $2,200 to $2,500.

It is another false assumption that the total medical school budget is spent for the education of medical students. There are a number of hidden costs in that budget. For example, most medical school faculties spend a considerable portion of their time in teaching nurses and training interns and residents in the teaching hospitals. The total number of graduate students (designating house staff by this term) sometimes equals the number of undergraduate medical students. Those medical schools connected with universities usually have graduate students working for the master and doctor of philosophy degrees and they are taught in the basic science departments of the medical school.

It is incumbent upon the entire profession to ascertain the facts and correct the erroneous impressions in the minds of the public, whenever and wherever possible.

(2) *Education for the Practice of Medicine*

The next topic considered was undergraduate medical education.

It was agreed that, somehow, we need to train the student not only in the physical sciences of clinical medicine and surgery but also in the ability to deal with the personal and human aspects of patients' problems. We believe the best way to do this is by the daily precept and example of the physician at the bedside. Only those who have practiced medicine know how to teach the practice of medicine. The voluntary, clinical faculty, engaged in private practice and giving part of their time to the medical school without remuneration, is very important in setting this example.

It was the consensus of the group that some attention should be paid to the economics of the practice of medicine including such subjects as office management, patient fees, and the finances of the young physician in general, professional and personal.

The legal aspects of the practice of medicine need to be emphasized and formally taught in the medical school. Such courses should take up the commitment of the insane, the narcotic laws, our practice liability, damage suits, etc. The ethics of the profession should be made

clear to the student in regard to his relationships with other doctors in consultations and otherwise and in respect to relationships with the various community and welfare agencies. This instruction should be continued into the intern and resident years for the young doctor certainly needs to learn some of the things about public relations which older doctors have learned by practicing medicine and dealing with the public as individuals and in groups.

It was agreed that in order to turn out the kind of doctors we all want, we must select medical students who can be envisioned as adequate doctors. The admissions committees, therefore, should give attention to the personal and human qualities of each candidate as well as grades and scores on the Medical College Admissions Test. Many schools have found that one of the best ways to get reliable information is from people who know the applicant personally. The premedical or college faculty is an excellent source of information since these people have taught the student for two or three years and know him as a person in addition to knowing his academic ability. Doctors can help the admissions work of the schools by writing critical letters of evaluation about candidates from their home towns. Superficial commendations which express an opinion but say nothing about the reasons for that opinion contribute very little. Since I have been at this meeting, I have had one or two doctors speak to me about candidates they knew who were applying to my school and they did so with some apology. They need not apologize. The admissions committee of my school welcomes information that comes from one who knows the student personally, since it very often gives the kind of thing we cannot find out from an interview, tests, or grades.

(3) *Education for General Practice*

The next item discussed was the importance of training young men for family physicians, or for general practice, or as general physicians—whichever term you prefer to use for the family doctor.

Many schools are developing or already have residency programs for general practice. This should be encouraged.

As a means of interesting students in general practice, as well as instructing them in fundamental aspects of the practice of medicine, many schools have encouraged their students to work with selected practitioners during the summer between the third and fourth years or for a period of one or two months during the third and fourth years. In some instances the student is paid a stipend of, say, $100 a month and sometimes he receives maintenance only. The medical school of the University of Kansas under the able leadership of Franklin Murphy has demonstrated what can be done by this method.

(4) *Negro Medical Education*

We next discussed the need for Negro medical education in the South, both undergraduate and graduate.

As you know there are now only two Negro medical schools in the country. However, 54 of the nation's 79 medical schools admit Negroes; practically all schools do, except those in the South.

There has been discussion in the profession of the desirability of membership for the Negro physician in national medical societies. One deterrent has been the fact that hotels in which the societies meet will not admit Negroes as guests. The Committee has no solution for this vexing problem but believes that it probably would be good for the over-all welfare of the country as well as the Negro physician if he were permitted to belong to worthwhile organizations of national scope.

It was agreed that intern and residency training programs for Negro physicians in the South were deficient in quality and number. The Homer G. Phillips Hospital here in St. Louis offers one of the best examples of a good graduate training program for Negroes. This hospital is the Negro division of the City Hospital of St. Louis, and both Washington and St. Louis Universities participate in the educational program for the house staff.

If these programs are to be completely successful, there must be cooperation on the part of other physicians in the community as well as those who are members of medical school faculties. If this fuller participation is not forthcoming or drops off, these programs will naturally deteriorate. This is in line with the experience of communities which have started graduate training programs for Negroes only to have them fail because of lack of active participation by the medical school faculty and the medical profession of the area.

(5) *Regional Integration of Hospital and Medical Services*

The need for regional integration of hospital and medical services was the next matter discussed. I mentioned this in the last report but will state the matter a little differently here.

There are several examples of regional plans in this country and some have been in effect for many years. One is the Bingham Associates Plan in New England which has done much to raise the level of medical care in rural Maine, in cooperation with the Tufts Medical School and the Pratt Diagnostic Hospital in Boston.

The Kellogg Foundation has a number of plans in operation with chief emphasis on residency and intern training in outlying hospitals. These hospitals are affiliated with the parent medical center, which may or may not be related to a medical school.

The Commonwealth Fund has sponsored a similar plan with again a slightly different emphasis. The emphasis here is placed on special training for the ancillary personnel which is required to staff the small hospital adequately. The most notable example is the program established by the affiliation of a number of hospitals in the central section of New York State, extending from Rochester to Elmira, New York. The operating room supervisor, the laboratory and x-ray technician, and all personnel requiring specialized instruction can be trained in the medical center. A central purchasing agency has even been set up through which the hospitals can buy items not available in their respective communities.

It seems to me that the problem of adequate staffing for the small hospital is more pressing than ever because of the large number of smaller hospitals going up over the country with Hill-Burton funds.

While all of these plans have different emphases, their efforts are directed toward the common goal of better medical care. Medical schools should and would like to participate in these plans to serve their region and communities, but medical schools are short of funds.

In January of 1950 the Georgia Hospital and Health Council was organized for the purpose of initiating a regional plan for this state. (I mention this for interest since I know about this plan.) This group is made up of practicing physicians, chiefs of staff and staff members of various hospitals in the state, some hospital administrators, and two members of the Public Health Service, representing the dental and nursing professions. This group of about 75 people constitute the over-all governing body of the Council which also has an Executive Committee. The idea of the Council is to obtain funds from any available sources: from local foundations, from philanthropists, or by assessment of individual hospitals—the small hospital paying $500 or less than the larger hospital contributing $1,000, more or less. It was thought possible to accumulate a budget of $35,000 to $50,000 and with these funds to employ full-time people who are experts in hospital management and administration and under them, people who are experts in food service, laundering service, and the mechanics of special equipment and apparatus. A travel budget would permit these experts to visit each hospital and consult with the doctors, chiefs of staff, and the administrator on the job with reference to local problems and their solution.

There is great need for training technicians in laboratory work, radiography, and other special fields and under this program it is hoped that such training could be provided at base hospitals.

The Council has no funds as yet, but we have the organization; the people of Georgia are interested, and we believe we shall be able to raise sufficient funds to put the plan into operation.

To cite our own experiences again, Emory University has a grant from the Kellogg Foundation which is being directed toward a residency and intern training program for outlying hospitals. It is just getting started.

The Committee believes that development of these plans for integration of medical services by states and regions can do far more than compulsory health insurance to improve the quality and distribution of medical service. It seems to me that it would be most helpful if the Southern Medical Association would endorse such programs in principle. (My Committee did not vote on this, but we talked about it.) Then, later an appropriate article might be published explaining these schemes in greater detail than time permits today.

(6) *Federal Support of Medical Education*

The final item of business was a re-affirmation of the Committee's position, taken last year, in regard to Federal support of medical education. That is: while deploring the necessity of financial aid to medical education, we believe it is essential to the nation's medical schools, providing the money is given in such a way as to preserve academic freedom and with no strings attached, and providing it is made mandatory that the Surgeon General follow as well as secure the advice of the Advisory Council.

Book Reviews

Pioneer Doctor. By Lewis J. Moorman, M.D., Former Dean, University of Oklahoma School of Medicine; Editor, Journal of the Oklahoma State Medical Association; Past President of the Southern Medical Association. 252 pages, with illustrations. Norman, Oklahoma: University of Oklahoma Press, 1951. Price $3.75.

Lewis Moorman, the Sir William Osler of the Southwest, has published an autobiography entitled, "Pioneer Doctor." In the first hundred and ten pages, he relates the homely adventures of a young doctor, one of the settlers of Oklahoma, in its Cimmaron days. His experience with patients, whom he served as a country doctor, are even more interesting than those recorded by Dr. Hertzler in "The Horse and Buggy Doctor."

The story of Dr. Moorman's transition from a general practitioner into a thoroughly trained internist and specialist in tuberculosis, shows the influence of Osler, to whom he referred as "my ideal exponent of culture in the profession of medicine." First he practiced medicine for ten years before he began training to become a specialist; and he passed through Osler's "bread and water period" when he had time to study and for thorough examinations of his patients. Perhaps his best year's preparation for his life work was while waiting for patients, who were few and far between. He read John Burroughs, John Muir, Hamlin Garland, Francis Parkman, Robert Louis Stevenson, and David Grayson. His early knowledge of medicine came largely from studying the first edition of Osler's "Practice of Medicine." For his knowledge of pathology, he went to Vienna, following the footsteps of Osler. From Osler's philosophical essays he learned that "medicine is of the heart as well as of the head." Finally the Oklahoman's psychological approach in dealing with his patients and his interest in medical history parallel the expressed ideals of the sage of Johns Hopkins.

Dr. Moorman, Past President of the Southern Medical Association and of the National Tuberculosis Association, and formerly Dean of the University of Oklahoma's School of Medicine, is a man of great ability and culture. He is recognized as an authority in the field of tuberculosis. "Pioneer Doctor" is a book that older doctors should read and then present to recent graduates of medicine, who must learn the art of medicine from experience and from reading biographies of successful physicians. It is more than an autobiography. It is accurate and interesting history of Oklahoma and its Indians, and of tuberculosis, particularly as related to its effects on the lives of celebrated victims of that disease.

Medical Diseases of the Kidney: An Atlas and Introduction. By J. F. A. McManus, M.D., Associate Professor of Pathology, The Medical College of Alabama, Birmingham, Alabama; late Beit Memorial Fellow in Medical Research, the University Museum, Oxford, England. 176 pages, illustrated. Philadelphia: Lea and Febiger, 1950. Price $6.00.

This monograph on kidney function represents a study

by Dr. McManus over a number of years in the field of histochemistry, investigating almost exclusively the normal and diseased kidney. New ground is broken by the author's correlation of intracellular chemistry with function. The traditional methods of staining by hematoxylin and eosin have been supplemented by the periodic acid-Schiff's reagent and the alkaline phosphatase technic demonstrating the enzymes involved in tubular phosphorylation. Both of these maneuvers stress "functional lesions" in contrast to the mute alterations depicted by cold hematoxylin.

In a brief review, it is not possible to dissect and analyze all components of a work, but certain portions of this monograph demand special attention. The anatomical pattern of the normal glomerulus, always troublesome to medical students, is startlingly clear with periodic acid stain in photomicrographs 3, 4, 5. Plates 29-34, illustrating the ischemic alterations found in diseased glomeruli, are excellent. The detail is exquisite. There is no doubt that the periodic acid method in McManus' hands reveals intimate details of the glomerular-capillary unit and the juxtaglomerular apparatus not possible with routine tissue stains.

The classification of kidney failure into acute and chronic phases has much to commend it, particularly as pathologists and clinicians alike frequently neglect the terminal acute manifestations of a shrunken, scarred kidney. On the other hand, the reviewer feels that certain phases of kidney disease could be dealt with in a more vigorous fashion. Renal problems, such as the "shrunken kidney" and toxic nephrosis, are dismissed in a cursory manner. The group of nephroses would appear to be a fruitful field for histochemical research, as yet unexplored. "Incidental diseases" mentioned in chapter 13 should be enlarged in scope, treatment, and illustrative material.

In bringing function and chemistry to the individual renal cell, Dr. McManus has re-emphasized for pathologists the dynamic processes associated with the evolution of disease. To the clinician this book is well worth the price, if only to indicate the changing concepts in kidney pathology.

Communicable Diseases. Edited by Roscoe L. Pullen, A.B., M.D., F.A.C.P., Professor of Graduate Medicine, Director of the Division of Graduate Medicine, and Vice-Dean of the School of Medicine, Tulane University of Louisiana, New Orleans. 1,035 pages, with illustrations, some in color. Philadelphia: Lea and Febiger, 1950. Price $20.00.

The arrangement of infectious diseases in this book is unusual and has much to recommend it. The classification is according to the organ system in which the outstanding phenomena occur. Thus one section deals with disorders producing predominant manifestations in the skin, another with those infections which affect chiefly the respiratory tract, another with those affecting mainly the central nervous system, etc. Such an approach differs widely from the usual classifications according to etiologic agents, or to modes of transmission.

It goes without saying that the classification adopted is subject to serious disadvantages. Thus syphilis is grouped under "Communicable Diseases with Predominant Skin Manifestations," which tends to emphasize the more obvious at the expense of the more serious manifestations. The same criticism may be applied in regard to histoplasmosis and coccidiodomycosis.

On the other hand, the approach used has important advantages, especially from the standpoint of differential diagnosis. Thus the arrangement is useful in bringing to mind immediately the most likely causes of an acute cough with fever, or of meningeal irritation.

Most of the authors are from New Orleans and are affiliated with one of the teaching institutions of that outstanding medical center, with its wealth of clinical material, including instances of the rarer tropical and oriental infections as well as those which are common throughout the United States. The majority of the chapters are well written and appear to be based on extensive personal experience rather than the all too common tendency to survey the literature and "cook the scraps of others' fare." The text is good throughout, and excellent in some portions. The illustrations are first-class, and they alone are worth the price of the book.

Pathologic Physiology. Mechanisms of Disease. Edited by William A. Sodeman, M.D., F.A.C.P., The William Henderson Professor of the Prevention of Tropical and Semi-Tropical Diseases, Tulane University of Louisiana School of Medicine, New Orleans. 808 pages, illustrated. Philadelphia and London: W. B. Saunders Company, 1950. Price $11.50.

Dr. Sodeman and a group of twenty-four collaborators have combined efforts to present an entirely new kind of medical textbook.

The chapters divide the discussion into the organ systems and pathogenic classifications utilized in most textbooks of clinical medicine, but here all similarity to the customary approach to medical writing ends. Each chapter is written by a recognized authority in his field with the point of view of the clinician-physiologist. The result is a dynamic and highly readable presentation of the mechanisms of disease rather than the traditionally dull recital of signs and symptoms and differential diagnosis, demanding of the reader more rote than reason. Particularly noteworthy are the four chapters devoted to various aspects of infectious diseases by George T. Harrell, Jr.; the group of chapters dealing with the physiology of the cardiovascular system in health and disease by Hull, Sodeman and others, and the illuminating essay on diseases of the blood by W. B. Castle. Also worthy of comment is the generous use of illustrations and tables, and particularly of a host of highly descriptive diagrams which add further value to a text of more than average interest. In an 800-page volume, one might question the advisability of confining one-fourth of the book (200 pages) to cardiovascular considerations, despite the predominance of circulatory diseases in clinical medicine, when this results in the restriction of the description of diabetes mellitus to a few paragraphs. One might further question the editor's decision not to give separate chapter consideration to the all important field of diseases of metabolism. The relative emphasis devoted to various fields of medicine notwithstanding, Dr. Sodeman's superb book should be a source of stimulation not only to physicians who desire

a better understanding of the mechanisms by which signs and symptoms of disease develop, but also to those who would better acquaint themselves with current trends in clinical investigation.

The Mask of Sanity. An Attempt to Clarify Some Issues About the So-Called Psychopathic Personality. By Hervey Cleckley, M.D., Professor of Psychiatry and Neurology, University of Georgia School of Medicine, Augusta, Georgia. Second Edition. 569 pages. St. Louis: The C. V. Mosby Company, 1950. Price $6.50.

Dr. Cleckley's book is a masterly description of the clinical entity, psychopathic personality, which has caused endless arguments. Whether the individual is psychotic or not, whether he has a break with reality or not, and whether he should be classed among the legally insane is in dispute. Through a multitude of case presentations the author describes vividly the many forms this personality deviation may take until there remains very little excuse for failure to recognize it. This is an excellent book for classification of this disorder.

The author, from an extensive interest and experience with such cases, is able to formulate and present a hypothesis of his own in which there is much food for thought. His book comes very close to being what has long been sought for as an aid in dealing with and understanding such patients, in that for the first time it distinguishes between frank schizophrenia and psychopathic personality. It gives one of the best reasons for their behavior and seems to provide a very sound hypothesis.

Nursing Care of Neurosurgical Patients. By Roland M. Klemme, M.D., F.I.C.S., F.A.C.S., Professor of Surgery, St. Louis University School of Medicine, St. Louis, Missouri. 117 pages, illustrated. Springfield, Illinois: Charles C. Thomas, Publisher, 1949. Price $3.00.

This book based on the author's lectures on neurosurgical nursing, should prove to be a very useful text and reference for nurses in that field. It is written in a semi-outline form which makes it very easy to find desired information quickly. The chapters on the anatomy of the brain and spinal cord and on the clinical signs and symptoms of neurological pathology are particularly valuable and complete. There are also good though brief chapters on various pathologic conditions such as neuralgias. A considerable portion of the book is taken up with a detailed account of the scrub nurse's set-up for various surgical procedures and with photographs and descriptions of the instruments used. These, while interesting, could prove confusing to the nurse whose hospital had a different method of procedure.

Advances in Internal Medicine. Editors: William Dock, M.D., Long Island College of Medicine, Brooklyn, New York; I. Snapper, M.D., The Mount Sinai Hospital, New York, New York. Associate Editors: Tinsley R. Harrison, M.D., Medical College of Alabama, Birmingham, Alabama; Chester S. Keefer, M.D., Evans Memorial and Massachusetts Memorial Hospitals, Boston, Massachusetts; Warfield T. Longscope, M.D., Cornhill Farm, Lee, Massachusetts; J. Murray Steele, M.D., Goldwater Memorial Hospital, New York University Division, Welfare Island, New York. Volume IV. 549 pages. Chicago: The Year Book Publishers, Inc., 1950. Price $10.00.

Fourth in a series of annual reviews by editors and associate editors widely recognized for their investigative and teaching accomplishments is this volume. Topics selected range widely in substance and include vascular physiology, brucellosis, liver disease and tests, anticoagulants, neuromuscular disorders and nitrogen mustards. With one exception these articles were prepared by American authors who have concerned themselves with definitive investigation in the field. Each subject is comprehensively treated, carefully outlined, indexed and finally documented with an abundant bibliography. Selection of the subjects reflects judgment in that material progress has already been accomplished, thus minimizing untried and untenable viewpoints. It will appeal to a limited audience of investigators, scholarly physicians and most, perhaps, to students of internal medicine at the graduate level.

Atomic Attack, a Manual for Survival. By John L. Balderston, Jr., Physicist-Engineer at Oak Ridge, Tennessee, 1943-47; Radioisotope Research Consultant, Los Angeles, California; and Gordon W. Hewes, Analyzer of Japanese target-cities for the 20th Air Force, World War II; Presently Assistant Professor of Anthropology, University of Southern California. 55 pages. Culver City, California: Culver Products Company, 1950. Price $1.00.

The need is recognized for concise information in case of atomic attack. These authors stress the disaster but note that we are not helpless.

Part one explains what to do before and after a bomb attack. Part two gives reasons why we protect our eyes from the white flash; and our bodies from the intense heat and radiation effects. This book is a valuable addition to a modern library.

Recent Advances in Chemotherapy. By G. M. Findlay, C.B.E., Sc.D., M.D., F.R.C.P., Editor, Abstracts of World Medicine and Abstracts of World Surgery, Gynaecology and Obstetrics, British Medical Association, London. Third Edition. Volume I. 625 pages. Philadelphia and Toronto: The Blakiston Company, 1950. Price $7.50.

The tremendous advances in chemotherapy have necessitated an extension of this textbook, which promises to become a classic in its field. This, the first volume, deals with the chemotherapy of scabies and of helminthic and protozoal diseases. The following three volumes will include recent progress in the therapy of malaria, of bacterial, rickettsial, and viral diseases, and a survey of the sulfa drugs and antibiotics. The author has done an exceptionally thorough job in reviewing the chemotherapeutic and chemoprophylactic action of in-

numerable compounds in man as well as in animals. A chapter on drug resistance in trypanosomiasis merits particular interest. An extensive bibliography supplements each chapter.

Most physicians will not require such a detailed evaluation of chemotherapy. Research workers, however, or those seeking accurate information on some specific phase of this subject, will consider it an indispensable source book.

The Diagnosis and Treatment of Endocrine Disorders in Childhood and Adolescence. By Lawson Wilkins, M.D., Associate Professor of Pediatrics, The Johns Hopkins University, The Harriet Lane Home, The Johns Hopkins Hospital, Baltimore, Maryland. 384 pages, illustrated. Springfield, Illinois: Charles C. Thomas, Publisher, 1950. Price $13.00.

The material in this well written book has been assembled under the headings of the various endocrine glands. Each of these with its various degrees of hypofunction and hyperfunction is briefly but fully discussed. Many excellent charts aid in comparison of the data in the different age groups. An extensive bibliography is found at the end of each chapter.

At the end of each chapter there is an atlas which contains many well chosen pictures of patients who illustrate each disorder. This is one of the best features of the book as comparisons are frequently made with normal individuals and with patients manifesting other diseases that are often mistaken for endocrine diseases.

An important chapter (IV) is given to the discussion of methods of diagnosis. Evaluation of many tests and the indications for their use are included.

Special chapters discuss dwarfism (VIII), sexual precocity (X) and sexual infantilism (XI). Fully outlined are the various etiological backgrounds, differential diagnoses and treatment of these symptom complexes which often have endocrine disorders as their primary cause.

A chapter (XXI) is devoted to congenital anomalies and other disorders not associated with hormonal dysfunctions, which may superficially resemble them.

Although this book is written about endocrine disorders of childhood and adolescence, anyone interested in clinical endocrinology will find it worthy of study. It is valuable as a clinical reference book to the busy practitioner or student because of the ease in finding data desired with a minimum of effort.

Handbook of Physical Medicine and Rehabilitation. Selections authorized for Publication by the Council on Physical Medicine and Rehabilitation, American Medical Association. First Edition. 573 pages, with illustrations. Philadelphia and Toronto: The Blakiston Company, 1950. Price $4.25.

This book is indeed a first edition, because the three previous editions published by the A.M.A. were called the *Handbook of Physical Therapy* and were less complete. This is the fourth of the series. It is made up of selections by eminent authors who discuss the problems and the technical means at the disposal of physicians for treating various conditions. The emphasis on rehabilitation includes such topics as climatology and health resorts, occupational therapy, amputees, artificial limbs, and an entire chapter or two on the subject of rehabilitation *per se*.

Methods of organization of physical medicine in hospitals with fifty beds or more are outlined. A good description and evaluation are made of the various forms of administering heat and massage and of the types needed for various conditions. Special uses of hydrotherapy and electrical energy sources are covered. Electrolysis is treated separately as are the physical methods needed for poliomyelitis. Special problems arising in psychiatric practice, dermatology, ophthalmology and otology are described in separate chapters.

Illustrations and diagrams are not numerous but are used effectively when necessary. This is a useful and well constructed book.

Emergencies in Medical Practice. Edited by C. Allan Birch, M.D., F.R.C.P., Physician, Chase Farm Hospital, Enfield. Second Edition. 564 pages, with 131 illustrations, 8 in color. Baltimore: The Williams and Wilkins Company, 1950. Price $5.50.

The physician "faced with an acutely ill patient or a critical situation" will find this book on medical emergencies of inestimable value. A large number of problems requiring rapid diagnosis and treatment are considered, some of them as far apart as sudden blindness and how to remove a "fixed wedding ring." Medical emergencies in abdominal catastrophes, in disease of various organ systems, in tropical and industrial medicine, are among the topics discussed, together with urgent problems in neurology and psychiatry. Special consideration is given to medical emergencies in infancy and childhood. The chapter on acute poisoning is somewhat brief, in view of the importance of the subject.

There is an excellent review of the hazards of medical procedures, such as broken needles and reactions to certain drugs. Another section contains well illustrated descriptions of "practical procedures": cisternal puncture, splanchnic block, artificial respiration, and others. It is difficult to cull information of this nature from textbooks, and this compilation fills a real need.

The Red Cross Nurse in Action, 1882-1948. By Portia B. Kernodle. 524 pages, illustrated. New York: Harper and Brothers, Publishers, 1949.

This complete and well documented account of the Red Cross nursing service will be valuable to any nurse who is interested in the background of her profession and in its pioneer leaders. The Red Cross nursing service led the way into many new fields of nursing, such as war nursing, rehabilitation nursing and public health nursing, which are now carried on by other organizations; and the record of its achievements is inspiring to all nurses. The material contained in the appendices, in the statistical tables and in the plates add much to the value of this book as a reference work. Its rather stogy style will prevent its becoming popular reading.

Southern Medical News

DR. CURTICE ROSSER HONORED

The Dallas Southern Clinical Society, at its twentieth annual meeting in Dallas, Texas, gave its Marchman Award for "outstanding scientific contributions and distinguished service to medicine" to Dr. Curtice Rosser, Dallas. The award, evidenced by a plaque suitably engraved, came as a complete surprise to Dr. Rosser and was presented to him at the public meeting of the Society in the Crystal Ball Room of the Baker Hotel on Monday evening, March 26, the presentation being made by the President, Dr. Edwin L. Rippy, who referred to Dr. Rosser as "dean of his specialty (proctology) in Dallas, a prolific writer in his field, a close friend of all young doctors in this community."

The Marchman Award was named in honor of Dr. Oscar M. Marchman, first president of the Dallas Southern Clinical Society, who was largely responsible for the formation of the Society. The first award was made in 1947 and Dr. Rosser is the fifth distinguished physician of Dallas to receive the award, previous recipients having been Dr. Joseph M. Hill, Dr. Arthur Grollman, Dr. Carl A. Moyer and Dr. Tinsley R. Harrison.

The Dallas Morning News of Wednesday, May 28, in an editorial entitled "Marchman Award" had this to say:

"Service awards are fine things, accenting as they do outstanding contributions to the betterment of life, to the progress of civilization. Of all commemorations of achievement, none can be more appreciated by the recipient than that for outstanding professional attainment. In character these are less understood by the lay public, but to his fellows in any chosen field, the folk whose recognition it is natural that he appreciates most, the recipient has done something beyond the deeds of the mill run of us.

"So the award by the Dallas Southern Clinical Society of its annual Marchman plaque must have been especially gratifying to Dr. Curtice Rosser when the citation noted that his individual eminence and personal contribution to the field had made Dallas outstanding in medicine for the number and ability of doctors specializing in proctology."

This Marchman Award is just one of many merited honors that have come to Dr. Rosser. He is now President of the Southern Medical Association, past president of the Dallas County Medical Society, Dallas Southern Clinical Society and the American Proctologic Society. He is one of the pioneer organizers of the American Board of Proctology, and now serves as its first president. He was active in organizing the Section on Proctology of the Southern Medical Association.

ALABAMA

The Annual Session of the Medical Association of the State of Alabama was held in Mobile April 19-21, with headquarters at the Admiral Semmes Hotel. President Joseph M. Weldon, Mobile, presided. The Mobile County Medical Society, Dr. A. D. Henderson, President, was host to the Association.

The following officers of the Alabama Academy of General Practice were elected at a recent postgraduate seminar at the Medical College of Alabama, Birmingham: Dr. A. S. Dix, Mobile, President; Dr. A. F. Wilkerson, Marion, President-Elect; and Vice-Presidents, Dr. J. E. Foster, Lineville, Dr. George W. Newburn, Jr., Prichard, Dr. Greene Smith, Ensley, and Dr. W. B. Virgin, Montgomery. Dr. J. N. Carmichael, Fairfield, was elected a member of the Board of Directors.

Dr. Alston Callahan and Dr. Charles P. Grant, Birmingham, have announced the Association of Dr. Joseph M. Dixon, their specialty being diseases of the eye.

ARKANSAS

Dr. Roy Schirmer, Fort Smith, and Dr. Allan G. Cazort, Little Rock, attended the Seventh Annual Meeting of the American Academy of Allergy in New York City recently.

Dr. Fred Hames, Pine Bluff, has been elected Chairman of the Association of Tumor Clinic Staffs in Arkansas.

Dr. Hoyt R. Allen, Little Rock, has announced the association of Dr. John Laurens, who recently completed residency at the Ochsner Clinic in New Orleans, Louisiana, in the practice of proctology.

Dr. H. T. Smith, McGehee, and Dr. D. L. Owens, Harrison, have been elected President-Elect and Vice-President respectively, of the Mid-South Postgraduate Medical Assembly.

Dr. C. H. Lutterloh, Hot Springs National Park, has joined the staff of the Veterans Hospital, Little Rock. He is Assistant Chief of Professional Services.

Dr. Robert Watson, Little Rock, attended the recent session of the Southern Neurosurgical Society in New Orleans, Louisiana.

Dr. R. B. Robins, Camden, Vice-President of the American Medical Association, has been named President-Elect of the American Academy of General Practice.

Dr. A. J. Brizzolara, Little Rock, is doing special work on pathology of the larynx with Dr. Chevalier Jackson in Philadelphia.

Dr. Ellery C. Gay, Little Rock, has been elected to membership in the American Society of Plastic and Reconstructive Surgery.

Dr. N. W. Reigler, Little Rock, in service in Korea, has received the Combat Medical Badge and has been recommended for the Bronze Star.

DISTRICT OF COLUMBIA

Dr. Frank D. Costenbader has been appointed to the Editorial Board of the *Medical Annals of the District of Columbia*, to succeed Dr. James N. Greear, who has left Washington.

Dr. Frederick O. Coe has been nominated to succeed himself as Vice-President of the Washington Academy of Sciences, by the Executive Board of the Medical Society of the District of Columbia.

The Pan American Sanitary Bureau has purchased Hitt House and Blodgett House on Dupont Circle for its headquarters. The W. K. Kellogg Foundation and the Rockefeller Foundation advanced the funds for the purchase. Dr. Fred L. Soper, Director of the Bureau, has received official appointment as Director of the Regional Office for the World Health Organization, a position he has held unofficially since 1949. The appointment is for a period of four years beginning February 1, 1951.

A clinic for the Social Adjustment of the Preschool Blind has been opened at the Children's Hospital, Washington. Dr. Frank D. Costenbader, ophthalmologist for the Children's Hospital, initiated the project. The Clinic will be under the supervision of Dr. Everett Caldemeyer. The clinic will be open each Wednesday afternoon by appointment only.

Rear Admiral Clifford A. Swanson, Washington, Surgeon General of the Navy, has succeeded Rear Admiral Morton D. Wilcutts as Commanding Officer of the National Naval Medical Center.

Rear Admiral Clarence J. Brown, Washington, has been appointed Deputy and Assistant Chief of the Bureau of Medicine and Surgery, to succeed Rear Admiral Lamont Pugh, who has become Surgeon General of the Navy.

George Washington University School of Medicine, Washington, has received a research grant of $11,340 from the Public Health Service for research under Dr. J. Keith Cromer on the administration of progesterone and other steroids on cancer of the uterine cervix.

The Georgetown University School of Medicine, Washington, has received a $4,400 research grant from the Public Health Service for research on ACTH and cortisone in the treatment of leukemia, under the direction of Dr. C. E. Rath.

Dr. Aurora O. Rivera, Washington, has been appointed Assistant Director and Epidemiologist of the District Bureau of Venereal Diseases, to succeed Dr. A. Truxton Morgan who has been called into military service.

Dr. Everett J. Gordon, Washington, has been appointed Medical Director and member of the Executive Committee of the Board of Directors of the Metropolitan Police Boy's Club, to succeed his brother, the late Dr. Leon S. Gordon.

A two-year specialty training program for resident physicians in psychiatry at the George Washington University Hospital, Washington, has been approved by the Council on Medical Education and Hospitals of the American Medical Association and the American Board of Psychiatry.

The American Hearing Society, Washington, has announced that May 6-12 has been designated as National Hearing Week, with "Hearing is Priceless—Protect It!" as a theme.

FLORIDA

Dr. Sherman B. Forbes, Tampa, was recently appointed a Consultant to the National Society for the Prevention of Blindness.

Dr. Kenneth A. Morris, Jacksonville, has been elected Chairman of the Duval County Welfare Board, and Dr. Walker Stamps, Jacksonville, has been appointed to a special committee of the board.

Dr. John H. Mitchell, Jacksonville, retired recently as President of the Board of Trustees of the Baptist Home for Children, a position which he held 14 years. He will continue as a member of the Board of Trustees.

Dr. Bernard J. McCloskey, Jacksonville, has been elected Chairman of the Duval County Unit of the American Cancer Society.

Dr. Robert J. Needles, St. Petersburg, has been elected President of the St. Petersburg Heart Association. Dr. Norval M. Marr, St. Petersburg, has been made a member of the Board of Directors.

Dr. Russel L. Counts has opened offices in Jasper for the practice of medicine.

The second annual Medical Seminar of the Sarasota County Medical Society was held March 19-24 in Sarasota, with speakers provided by the Johns Hopkins University School of Medicine, Baltimore, Maryland.

Dr. Camillus S. L'Engle, Jacksonville, has returned to his

Continued on page 48

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Sound example of three-dimensional structure is LACTUM, Mead's evaporated whole milk–Dextri-Maltose® formula.

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Authoritative pediatric recommendations support this caloric distribution. And cow's milk and Dextri-Maltose formulas with these approximate proportions have been successfully used in infant feeding for forty years.

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Time-saving convenience

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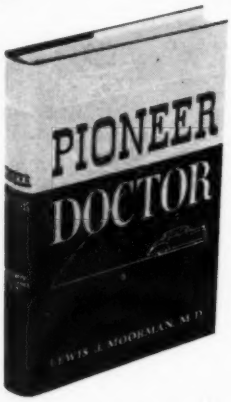


PIONEER DOCTOR

by LEWIS J. MOORMAN, M. D.

Dr. Lewis J. Moorman, a former president of the Southern Medical Association, is a world authority on tuberculosis. When he began his 50-year career in medicine in Oklahoma, a G. P. had to be ready for anything: gunshot wounds, ailing Indians, childbirth in a barn loft, and an outbreak of the "itch", which followed the ministrations of a "faith healer." The whole fascinating story of the passing of the family doctor and the rise of the urban specialist is wittily and humanly covered in this nostalgic reminiscence of half a century of medical practice.

"This is a book by a man who has seen much, who pioneered on the prairies, saw all significant progress in the control of tuberculosis and contributed greatly to it, and who was first, last, and always a kind, gentle and great doctor."—Esmond R. Long, M. D., Director, The Henry Phipps Institute, Philadelphia.

$3.75 at all bookstores, or

University of Oklahoma Press

NORMAN, OKLAHOMA

Continued from page 466

practice there after a special course in New York Hospital on preservation of life in premature babies.

Dr. Sanford Levine, Miami Beach, has been awarded a certificate of appreciation for outstanding service by the Third Army.

GEORGIA

Dr. Edward E. Brown, LaGrange, has become associated with Dr. R. B. Gilbert, Gilbert Clinic, Greenville, for the practice of medicine.

Dr. Ellison Richard Cook, Savannah, has been named Savannah's "Outstanding Man of the Year" by the Savannah Junior Chamber of Commerce.

Dr. E. C. Demmond, Savannah, has been elected President of the Hospital Service Association, Savannah. He succeeds Dr. Michael J. Egan, Savannah, to the office. Dr. St. J. R. deCaradeuc, Savannah, is a member of the executive committee.

Dr. Wallace M. Gibson, Milledgeville, a member of the Milledgeville State Hospital Staff, has been named chairman of the Baldwin County unit of the American Cancer Society.

New officers of the Chatham-Savannah Health Council are: Dr. Albert J. Kelly, Savannah, President: Dr. H. H. McGee, Savannah, President-Elect: and Dr. Ann Hopkins, Savannah, Vice-President. The following Savannah physicians were named to the Board of Trustees: Dr. T. A. Peterson, Dr. A. F. Williams, Dr. F. Bland Tucker, Dr. William Weichselbaum, Jr., Dr. C. A. Peterson, Dr. Lawrence Lee, Dr. Laurence Dunn, Dr. Ruskin King and Dr. Ellison R. Cook.

Dr. W. D. Lundquist, formerly of Augusta, has returned to his post as Commissioner of the East-Central Health Region with headquarters at Statesboro.

Dr. William McCollum, Thomasville, opened offices there recently for the practice of medicine.

Dr. Charles L. Prince, Savannah, has been elected a member of the Urologic Forum for Clinical Investigation. Membership in this organization is limited to 20.

The Savannah Tumor Clinic, Savannah, has been approved by the American College of Surgeons as an institution conducting cancer clinics.

Dr. John Edwin Taylor, Jr., Decatur, has announced the opening of offices there for the practice of pediatrics.

Dr. Walter D. Martin, a native of Shellman, has announced the opening of offices in Dawson for the practice of medicine.

The One Hundred First Annual Session of the Medical Association of Georgia was held last month in Augusta, under the leadership of its President, Dr. Alpheus Maynard Phillips, Macon.

The Atlanta Radiological Society has elected the following new officers: Dr. Albert A. Rayle, Sr., President: Dr. Leonard Long, Vice-President: and Dr. J. Dudley King, Secretary-Treasurer.

The Georgia Warm Springs Foundation has announced that it carried a record load of 973 patients during the year 1949-50, ending in September of 1950.

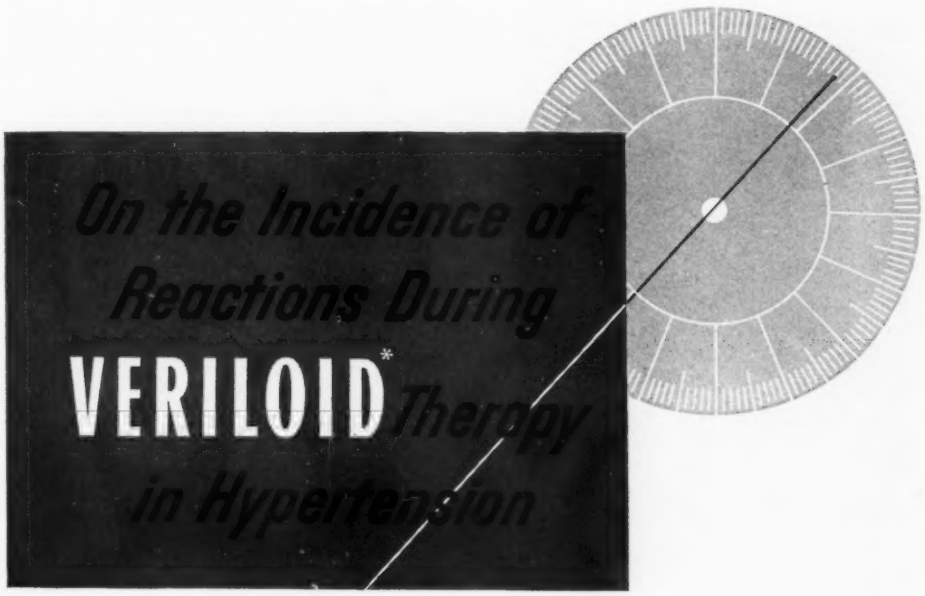
KENTUCKY

The new Covington-Kenton County Tuberculosis Sanatorium, Covington, was dedicated on Sunday afternoon, April 15. This beautiful new hospital is the last word in construction and equipment and now will be in active operation. The hospital is located amid attractive surroundings. It was dedicated with appropriate ceremonies, several thousand citizens of Covington and Kenton County being present. Dr. James A. Ryan, a past President of the Southern Medical Association, is President, Dr. George N. Burger, Vice-President, and the other members of the Board are prominent laymen. Dr. Charles J. Farrell is Medical Superintendent. The major credit for this new hospital is due to Dr. Ryan. The Southern Medical Association, upon invitation, was officially represented at the dedication by its Secretary and General Manager, Mr. C. P. Loranz, of Birmingham, Alabama.

Dr. Elmer L. Henderson, Louisville, President of the American Medical Association and the World Medical Association, has been elected President of the American Medical Education Foundation. The Foundation, founded at the December 1950 meeting of the American Medical Association, is raising funds within the medical profession for the unrestricted use of the nations medical schools. Last month Dr. Henderson left for a three-week tour of the military installations in the Pacific as a Medical Consultant to the Air Force. He was accompanied by Maj. Gen. Harry G. Armstrong, Surgeon General of the Air Force, and a number of other medical consultants.

Dr. Pat R. Imes, Louisville, Chairman of the Committee on Emergency Medical Service, has announced that members of medical societies which have cities of the second and third classes in their jurisdiction in Kentucky will have an opportunity to take a three-hour course in the treatment of injuries growing out of atomic warfare. If 50 per cent of the members of a society agree to attend the course, a specially picked team of instructors will go into each county that desires the instruction. The plan has been worked out in cooperation with the State Department of Health.

Continued on page 52



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The Significance of Nausea

As with all other Veratrum preparations, Veriloid when given in excessive dosage leads to nausea and eventually to vomiting. Extreme overdosage of Veriloid can produce hypotension and collapse. Intramuscular injection of ephedrine or phenylephrine promptly restores the blood pressure, and overcomes symptoms of hypotension.

The tendency toward nausea is an inherent action of the drug, a property shared by digitalis and other plant-derived medications. This action is valuable, since it gives the physician an important early indication of overdosage, thus making possible prompt adjustment of dosage to avoid development of more serious complications.

The Importance of Proper Dosage

Dosage needs of each patient must be determined individually. The optimal dose is that quantity which produces an acceptable drop in tension and which does not lead to nausea. This quantity is arrived at by initiating therapy with a dose of 2 mg. four times daily after meals and at bedtime and increasing the intake by small increments every third day until the satisfactory dose has been established. If this quantity is not exceeded and if a minimum of four hours elapses between each dose (regardless of when meals are taken), there is little likelihood that side actions will develop.

Veriloid has produced remarkable results in all forms of hypertension, including severe essential and malignant hypertension. Literature available on request.

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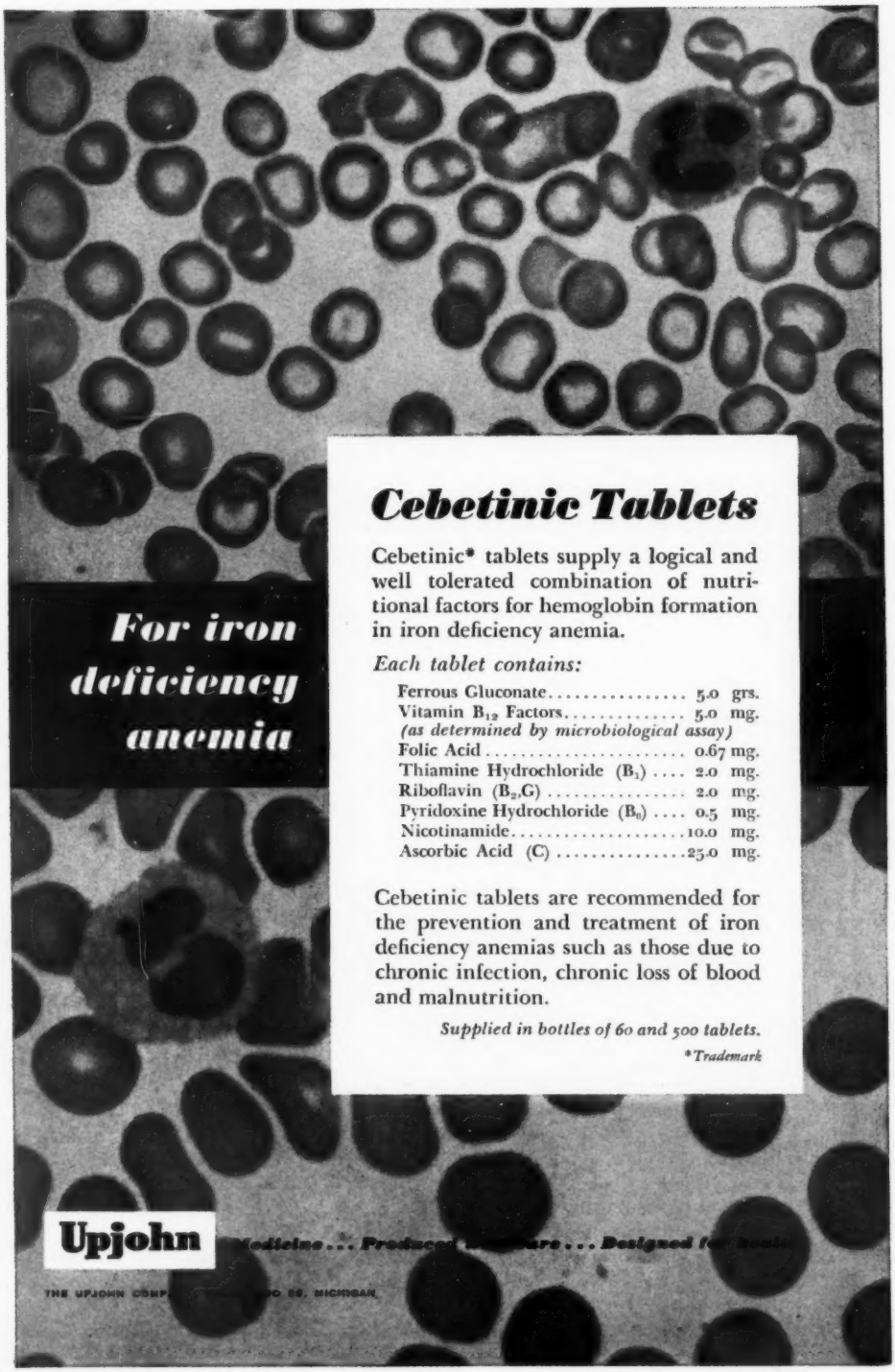
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Cebetinic tablets are recommended for the prevention and treatment of iron deficiency anemias such as those due to chronic infection, chronic loss of blood and malnutrition.
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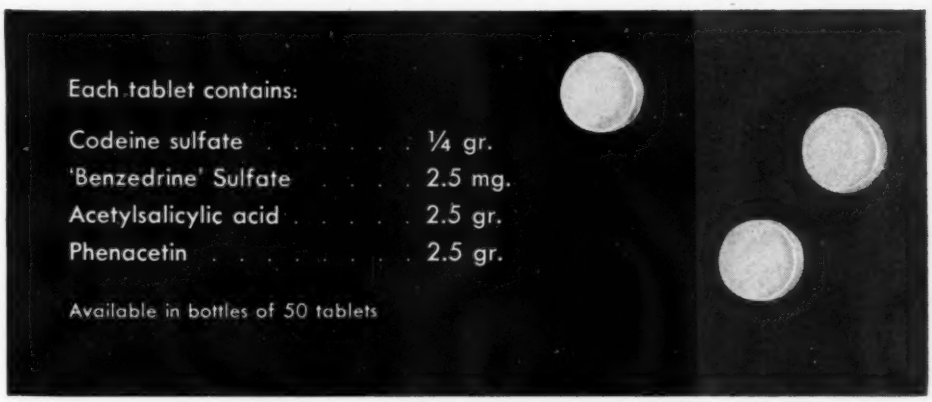
. . . there was less interference with sleep with 'EDRISAL with CODEINE',

. . . and spontaneous favorable comments were heard more frequently.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Codeine sulfate . . . . . ¼ gr.
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1. Long, C-F.: A Controlled Industrial Study of an Analgesic Compound, EDRISAL with CODEINE, Indust. Med. *19*:446 (September) 1950.

'Edrisal' and 'Benzedrine' T.M. Reg. U.S. Pat. Off.

Continued from page 48

Medical students at the University of Louisville School of Medicine have voted to set up an organization that will become a constituent part of the Student American Medical Association.

The 1951 Medical Seminar of the University of Louisville and the Kentucky State Medical Association will be held June 4-5 in Louisville, Dr. Herbert L. Clay, Director of Post-Graduate Refresher Training, has announced. The Seminar, which will be held in conjunction with the graduation exercises of the Medical School, is open to all physicians in Kentucky and surrounding states.

The Fourth Annual Meeting of the Kentucky Obstetrical and Gynecological Society was held in Ashland, April 6-7.

Dr. Sidney Evans Johnson and Dr. Jesshill Love, Louisville, have announced the association of Dr. Edward Nisbet Maxwell in the practice of radiology at the St. Joseph Infirmary, Louisville.

The University of Louisville School of Medicine, Louisville, has been awarded a $7,700 grant for poliomyelitis research by the National Foundation for Infantile Paralysis, the first grant ever given to a Kentucky Institution by the Foundation. Dr. Alex J. Steigman, Professor of Child Health at the University of Louisville School of Medicine, will conduct the research.

LOUISIANA

Dr. George E. Burch, Chairman of the Department of Medicine in the Tulane School of Medicine, New Orleans, was a special lecturer in a two-week course for physicians and research workers at the Oak Ridge Institute of Nuclear Studies, Tennessee. Dr. Paul J. Murison, Instructor in Medicine at Tulane, took part in the course.

Dr. Maurice Campagna, New Orleans, has been elected President of the newly formed Louisiana Trudeau Society. Dr. Lawrence Strug and Dr. Julius Lane Wilson, New Orleans, have been elected members of the Executive Committee.

Dr. William Gillentine, Dr. Edward Matthews, and Dr. J. O. Weilbaecher, Jr., New Orleans, attended the recent Southeastern Clinical Club Meeting in Birmingham, Alabama.

Dr. Lyon K. Loomis, New Orleans, was recently certified by the American Board of Orthopedic Surgery.

Dr. Andrew Kerr, New Orleans, has been elected to membership in the New Orleans Academy of Internal Medicine.

Dr. J. P. Wahl, New Orleans, was Chairman of the Arrangements Committee for the recent meeting of the Southeast Society of Oral Surgeons in New Orleans. Dr. Leopold Levy served as a member of the committee.

Dr. J. P. Sanders, Shreveport, has been installed as President of the Association of Family Doctors for 1951.

MARYLAND

The Annual Meeting of the Medical and Chirurgical Faculty of the State of Maryland was held April 24 and 25 in Baltimore. Dr. Beverley C. Compton was Chairman of the Committee on Scientific Works and Arrangements.

The Medical and Chirurgical Faculty of the State of Maryland has asked Dr. Robert H. Riley, Baltimore, Director of the State Department of Health, to be Chairman of the Committee of Civil Defense and to be in charge of Civil Defense health problems.

The Passano Foundation, Baltimore, has selected Dr. Philip Levine, Ortho Research Foundation of Raritan, New Jersey, and Dr. Alexander S. Wiener, Brooklyn, New York, as joint and equal recipients of the Passano Foundation Award for 1951. The $5,000 cash award was given to Dr. Levine and Dr. Weiner for their work relating to the discovery and clinical application of the Rhesus (Rh) factors in human blood. Previous winners of the Award are: Dr. Edwin J. Cohn, for investigation of blood derivatives (1945); Dr. Ernest W. Goodpasture, for studies in growth of viruses, bacteria, and Rickettsia in the chick embryo (1946); Dr. Selman A. Waksman, for isolation of the antibiotic, streptomycin (1947); Dr. Helen B. Taussig and Dr. Alfred Blalock, for their development of the "blue baby" operation (1948); Dr. Oswald T. Avery, for investigation of the pneumococci (1949); Dr. E. C. Kendall and Dr. Philip S. Hench, for their development and clinical application of certain adrenal and adrenotropic principles (1950).

The American Association of the History of Medicine will hold its annual meeting May 3-5 at the Institute of the History of Medicine of Johns Hopkins University, Baltimore. The meeting is open to all those interested in medical history.

MISSISSIPPI

A Heart Committee has been appointed by Dr. B. S. Guyton, Oxford, President of the State Medical Association, in cooperation with the State Board of Health. Dr. Thaddeus D. Labecki, Los Angeles, California, has been selected as consultant to the Heart Disease Control Unit.

The Annual Meeting of the Mississippi State Medical Association will be held at Biloxi, May 15-17, with headquarters at the

Continued on page 56

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A full-time course. In Obstetrics: lectures; prenatal clinics; witnessing normal and operative deliveries; operative obstetrics (manikin). In Gynecology: lectures; touch clinics; witnessing operations; examination of patients preoperatively; follow-up in wards postoperatively. Obstetrical and gynecological pathology. Anesthesia. Attendance at conferences in obstetrics and gynecology. Operative gynecology on the cadaver.

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A combined course comprising attendance at clinics and lectures; instruction in examination, diagnosis and treatment; witnessing operations; ward rounds; demonstration of cases; pathology; radiology; anatomy; operative proctology on the cadaver.

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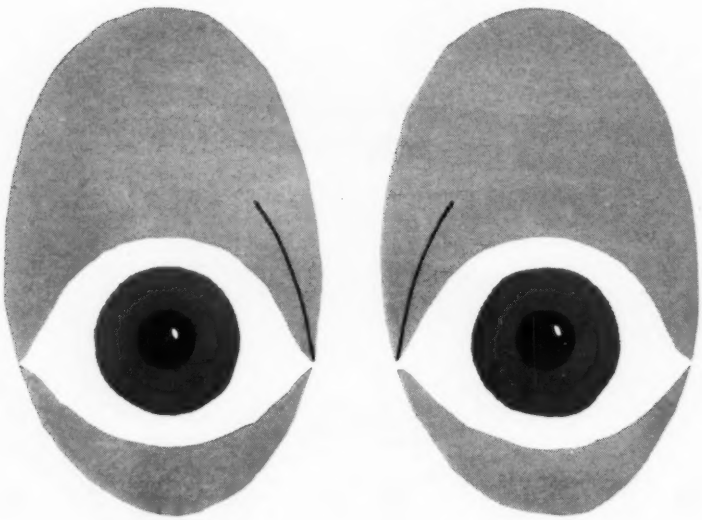

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Each adult dose, 2 fluid drams (2 teaspoonfuls), contains:	
Alcohol	10 per cent
Strychnine glycerophosphate, anhydrous	1/64 grain
Sodium glycerophosphate	2 grains
Calcium glycerophosphate	2 grains
Phosphoric acid, 75%	1.7 minims

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the formula of famous Neuro Phosphates, plus Vitamin B_1

(*0.75 mg. each adult dose*)

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Now...more rapid, more sustained relief of earache

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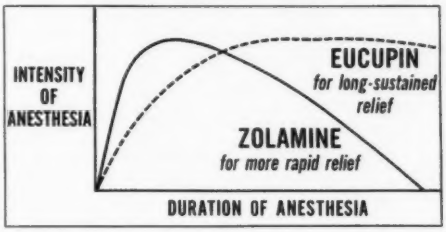
As compared to benzocaine and chemically related compounds, zolamine and Eucupin are more potent and therefore produce a clinically more desirable local analgesic effect.

Otodyne is slightly viscous, thus adherence of the active ingredients to the epidermal surface is promoted. Hygroscopic action effects mild decongestion.

NEW—two analgesics combined for complemental effect



Formula:

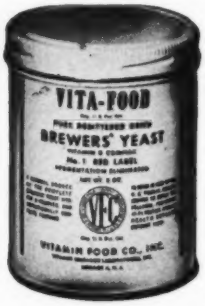
Zolamine (N, N-dimethyl-N'2-thiazolyl-N'-p-methoxybenzyl-ethylenediamine)	1%
Eucupin® dihydrochloride*	0.1%
Polyethylene glycol	q. s.

Dropper bottles of ½ fluid ounce (15 cc.)

White's OTODYNE® NEW ANALGESIC EAR DROP

WHITE LABORATORIES, INC.
Pharmaceutical Manufacturers, Newark 7, N. J.

*"Eucupin"—Brand of isoamylhydrocupreine is a registered trademark of White Laboratories, Inc.



"Those of us who have gained experience in treating deficiency diseases with yeast and wheat germ before the discovery and synthesis of the various members of the vitamin B complex have certainly been disappointed by the unsatisfactory results of the treatment of these diseases with single or combined synthetic fractions. Examinations in man under controlled conditions have revealed that many polyneuropathies cannot be cured with any combination of the available pure chemical products but only with yeast or wheat germ. One group of observers believed at one time that the reason for the limited effect of the pure vitamins was the administration of too small doses over too short a time and recommended the intake of larger amounts; but, as is well known, these are rapidly excreted in the urine. Another group wondered whether thiamin—and the other fractions of the B complex—had any, or at least any direct, curative effect on the nervous system."*

VITA-FOOD Green Label, widely used for pellagra, VITA-FOOD Red Label, in general practice, and AUTOLEX, enzyme autolyzed, whole brewers' yeasts are dependable sources of the NEEDED WHOLE of vitamin B complex, with a record unexcelled in nutrition and medicine.

*F. H. Lewey and H. Shay in dietotherapy Edited by M. G. Wohl. W. B. Saunders Co., 1945.

VITAMIN FOOD COMPANY, INC.

NEWARK 4, N. J.

Continued from page 52

Buena Vista Hotel. Dr. B. S. Guyton, Association President, will preside.

The Delta Medical Society held its 55th semi-annual meeting at Greenwood on Wednesday, April 11. Officers of the Society are: Dr. Toxey Hall, Belzoni, President; Dr. John W. Williams, Greenville, President-Elect; Vice-Presidents: Dr. Oscar Ringold for Bolivar County, Dr. T. J. Barkley for Humphreys County, Dr. John M. Alford for Leflore County, Dr. B. H. Booth for Sunflower County, Dr. T. B. Lewis for Washington County; and Dr. Howard A. Nelson, Greenwood, Secretary-Treasurer.

Four physicians, all State Medical Education Loan recipients, will begin internship at Mercy Hospital, Vicksburg, July, 1951. They are: William L. Carr, Jr., Laurel; Harry C. Frye, Jr., Jackson; Lamar Puryear, Jr., Raymond; and Luther D. Turner, Richton. They will enter practice in Mississippi following their internship, under agreement with the State and the State Medical Education Loan program. All will receive their Doctor of Medicine degrees this June.

Dr. James H. Hailey, Tupelo, now serving internship at Baptist Hospital, Jackson, is the first State Medical Education Loan recipient to intern within the state of Mississippi.

MISSOURI

The Kansas City Southwest Clinical Society will present merit awards of $500.00, $100.00 and $50.00 for original work of residents and interns of the area. The winner of the $500.00 award will be guest speaker of the Annual Clinical Conference. Information can be obtained from the Kansas City Clinical Society, 630 Shukert Building, Kansas City.

The Consulting Staff of the Ellis Fischel State Cancer Hospital, Columbia, met at the Hospital April 22, for a scientific program.

The Ninety-Third Annual Session of the Missouri State Medical Association was held in Kansas City April 22-25. Dr. C. Edgar Virden, Kansas City, was installed as president of the Association at the meeting.

Dr. Herbert L. Mantz, Kansas City, has been appointed Chief Consultant in Tuberculosis for the United States Veterans Administration.

Officers of the newly formed Hogden Club are: Dr. Avery P. Rowlette, Moberly, President; Dr. Cyril Costello, St. Louis, Vice-President; and Dr. Leo V. Mulligan, St. Louis, Secretary-Treasurer.

Continued on page 60

THE OPHTHALMOLOGICAL STUDY COUNCIL—Lancaster Courses in Ophthalmology

Westbrook Junior College, Portland, Maine

June 24 to September 9, 1951

SUBJECTS INCLUDED

Anatomy	Physiological Optics	Refraction
Histology	Visual Physiology	Slit Lamp
Embryology	Bio-Chemistry	Perimetry
Heredity	Pharmacology	Surgical Principles
Pathology	Neuro-Ophthalmology	Glaucoma
Bacteriology	Motor and Sensory	General Diseases and Ophthalmoscopy
Optics		

Fee: $300.

Veterans' Tuition Paid by Veterans Administration.

Adequate living quarters on the college campus.

For further information write

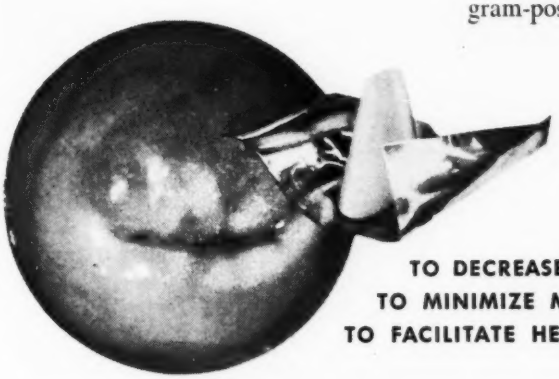
Ophthalmological Study Council, 243 Charles Street Boston 14, Massachusetts

IN VAGINAL AND CERVICAL SURGERY

Furacin Vaginal Suppositories are being used preoperatively to eradicate accessible bacterial infections of the cervix and vagina.

Postoperatively, following hysterectomy or conization of the cervix, their use facilitates primary healing by controlling the surface infection. Likewise, they can decrease greatly the slough, drainage and malodor.

Furacin is stable at body temperature —remains effective in the presence of exudates—is bactericidal to a wide variety of gram-negative and gram-positive pathogens.



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TO DECREASE DRAINAGE
TO MINIMIZE MALODOR
TO FACILITATE HEALING

Furacin Vaginal Suppositories contain Furacin 0.2%, brand of nitrofurazone N.N.R. in a base which is self-emulsifying in vaginal fluids and which clings tenaciously to the mucosa. Each suppository is hermetically sealed in foil which is leak-proof even in hot weather. They are stable and simple to use.

These suppositories are indicated for bacterial cervicitis and vaginitis, pre- and postoperatively in cervical and vaginal surgery.

Literature on request

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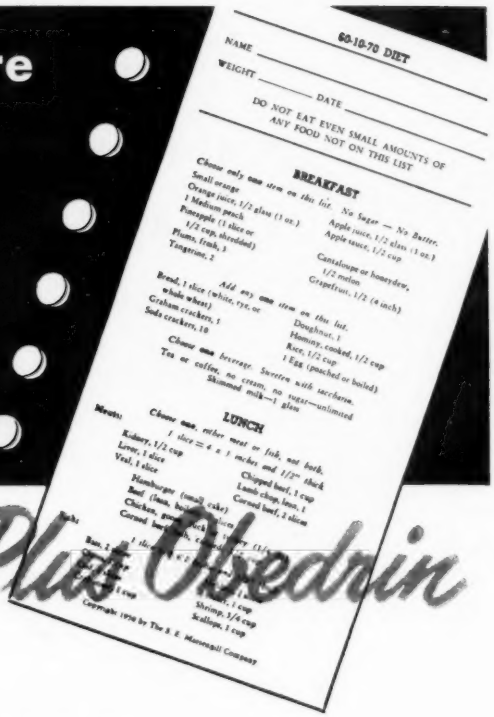
The NITROFURANS
O_2N R
A unique class of antimicrobials

Here is a more complete solution to the weight reduction problem...


60-10-70 DIET

NAME

WEIGHT DATE

DO NOT EAT EVEN SMALL AMOUNTS OF ANY FOOD NOT ON THIS LIST

BREAKFAST

Choose only one item on this list. No Sugar — No Butter.

Small orange
Orange juice, 1/2 glass (1 oz.)
1 Medium peach
Pineapple (1 slice or 1/2 cup, shredded)
Plums, fresh, 3
Tangerine, 2
Apple juice, 1/2 glass (1 oz.)
Apple sauce, 1/2 cup
Cantaloupe or honeydew, 1/2 melon
Grapefruit, 1/2 (4 inch)

Add any one item on this list.

Bread, 1 slice (white, rye, or whole wheat)
Graham crackers, 1
Soda crackers, 10
Doughnut, 1
Hominy, cooked, 1/2 cup
Rice, 1/2 cup
1 Egg (poached or boiled)

Choose one beverage. Sweeten with saccharine.

Tea or coffee, no cream, no sugar—unlimited
Skimmed milk—1 glass

LUNCH

Meats: Choose one, either meat or fish, not both.
1 slice = 4 x 2 inches and 1/2" thick
Kidney, 1/2 cup
Liver, 1 slice
Veal, 1 slice
Hamburger (small cake)
Beef (lean, broiled)
Chicken, guinea
Corned beef
Chipped beef, 1 cup
Lamb chop, lean, 1
Corned beef, 1 slice
Shrimp, 3/4 cup
Scallops, 1 cup

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THE 60-10-70 DIET Plus Obedrin

THIS PLAN

CURBS THE APPETITE

Through the use of the unique 60–10–70 diet and Obedrin tablets, considerable weight can be lost without troublesome hunger or impairment of nitrogen balance. Patient cooperation is assured because morale is kept high and excessive fatigue due to a nutritionally unsound diet is avoided.

MAINTAINS GOOD NUTRITION

The 60–10–70 diet allows free choice of many foods and supplies 70 Gm. of protein, 60 Gm. of carbohydrate, and 10 Gm. of fat, approximately 610 calories. The diet sheets are complete and self-explanatory, making it easy for the patient to do his share.

Obedrin permits adequate dosage of Semoxydrine Hydrochloride (methamphetamine) to suppress appetite. The corrective dose of pentobarbital cancels excessive central nervous stimulation, while vitamins help maintain the patient's sense of well-being.

FORMULA

Semoxydrine Hydrochloride	5 mg.
Pentobarbital Sodium	20 mg.
Ascorbic Acid	100 mg.
Thiamine Hydrochloride	0.5 mg.
Riboflavin	1 mg.
Niacinamide	5 mg.

Obedrin is supplied in bottles of 100, 500, and 1,000 yellow grooved tablets.

SEMCO

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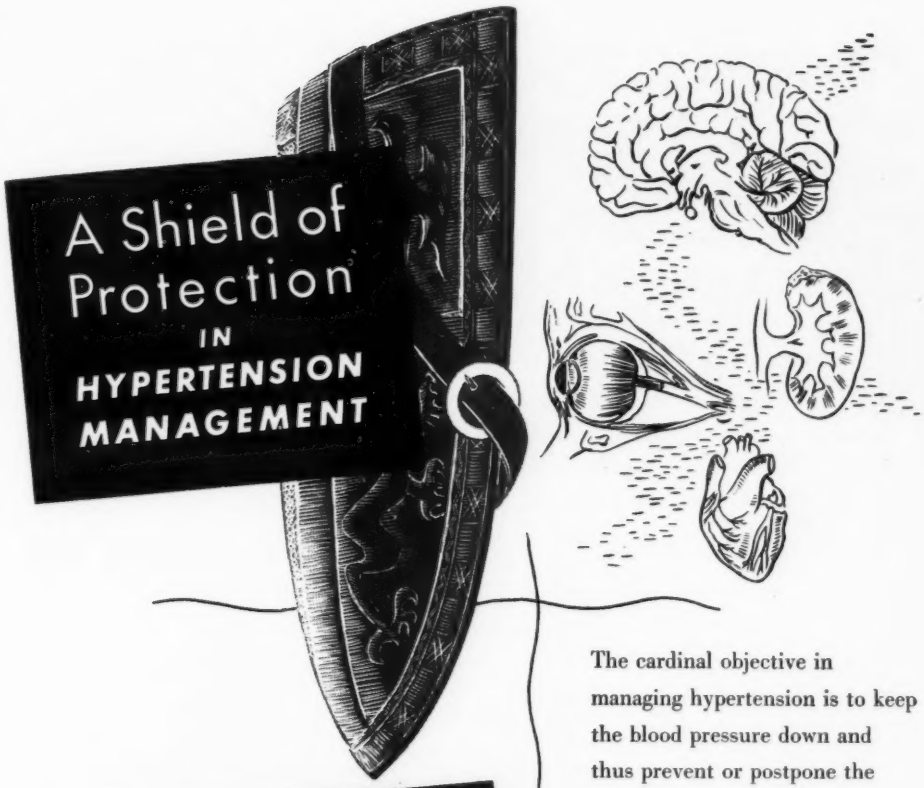
NEW YORK • SAN FRANCISCO • KANSAS CITY

SEND FOR YOUR COMPLIMENTARY COPY OF 60-10-70 DIET SHEETS TODAY

Obedrin



RUTOL

(A Brand of Rutin, Phenobarbital and Mannitol Hexanitrate, P.-M. Co.)

Each Tablet Rutol contains:

Rutin	10 mg. (1/6 gr. approx.)
Phenobarbital	8 mg. (1/8 gr.)
Mannitol Hexanitrate	16 mg. (1/4 gr.)

Bottles of 100, 500 and 1000 tablets.

The cardinal objective in managing hypertension is to keep the blood pressure down and thus prevent or postpone the damage to the heart, brain, retina and kidney.

Rutol provides the sustained, well tolerated vasodilative action of mannitol hexanitrate, the sedative action of phenobarbital and the prophylactic effect of rutin[1,2] on capillary fragility with bleeding tendency.

1. Griffith, J. Q., Jr., and Associates: Proc. Soc. Exper. Biol. & Med., 55:228, 1944.
2. Shanno, R. L.: Amer. J. Med. Sci., 211:539, 1946.

PITMAN-MOORE COMPANY
PHARMACEUTICAL AND BIOLOGICAL CHEMISTS
DIVISION OF ALLIED LABORATORIES INC., INDIANAPOLIS 6, INDIANA

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BLENDTOME

Portable

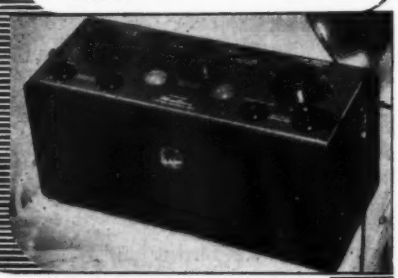
Electrosurgical Unit

. . . a MODERN LOW-COST SURGICAL UNIT for all minor and various major surgery.

The Birtcher BLENDTOME is a surprisingly practical unit for office surgery. With this lightweight unit, you have *all* the electrosurgical procedures of major units—electro excision, desiccation, fulguration and coagulation. While not meant to be compared to a large hospital unit, the BLENDTOME has been successfully used in many TUR cases. Such facility indicates the brilliant performance of the BLENDTOME.

ALL 4 BASIC SURGICAL CURRENTS

1. *Tube Generated Cutting Current.*
2. *Spark-Gap Generated Coagulation Current.*
3. *A controlled mixed blend of both above currents on selection.*
4. *Mono-polar Oudin Desiccation-Fulguration Current.*



Never before has a surgical unit of such performance been offered at the low price of the Blendtome.

Write "Blendtome Folder" on your prescription blank or clip your letter head to this advertisement. Reprint of electrosurgical technic mailed free on request. Please indicate your specialty.

THE BIRTCHER CORPORATION
5087 Huntington Drive Los Angeles 32, Calif.

To : The BIRTCHER Corp., Dept. SM 5-51
5087 Huntington Dr., Los Angeles 32, Calif.
Please send me, by return mail, free brochure on the portable Blendtome Electrosurgical Unit.

Dr. _____

Street _____

City _____ State _____

Continued from page 56

The club was formed recently to further the interests of the St. Louis City Hospital and the teaching and practice of surgery. The club is named after the late Dr. Thomas Hogden, who was one of the first two interns of the hospital, and one of its most highly honored alumni. Membership will be limited to 25 certified surgeons who are members of the St. Louis City Hospital Alumni.

Recently elected officers of the St. Louis Society of Radiologists are: Dr. Hugh M. Wilson, President; Dr. Hyman R. Senturia, Vice-President; and Dr. Donald S. Bottom, Secretary-Treasurer.

The Missouri State Board of Medical Examiners will give examinations at St. Louis University on May 31, June 1 and 2, and at the Washington University, St. Louis, on June 7-9.

The University of Missouri, Columbia, has received a renewal of a biology and medicine research contract from the United States Atomic Energy Commission. Dr. Samuel Brody will continue investigations on "Determination of Thyroid Activity in Farm Animals."

The Washington University School of Medicine, St. Louis, has received a gift of $50,000 from Miss Mary G. Reber for a nonmedical library which will be housed in the proposed Medical Student Dormitory Center. An endowment fund of $15,000 may be set aside for maintenance. If the Center is not constructed, the fund is to be used to finance medical scholarships.

A $600,000 Cancer Research Institute is being built at the St. Louis University School of Medicine, St. Louis. The five-story building, financed through a grant from the National Health Institutes, will adjoin Firmin Desloge Hospital.

NORTH CAROLINA

The Ninety-Seventh Annual Session of the Medical Society of the State of North Carolina will be held in Pinehurst, May 7-9. Headquarters will be at the Hotel Carolina. The Society's President, Dr. Roscoe Drake McMillan, Red Springs, will preside. Dr. Millard D. Hill, Raleigh, is Chairman of the Committee on Arrangements.

The Annual Winston-Salem Heart Symposium and Clinics, sponsored by the Winston-Salem Heart Association, was held there last month.

The Duke Medical Alumni Luncheon will be held during the meeting of the Medical Society of North Carolina, on Tuesday, May 8, at the Mid Pines Club, Southern Pines.

Dr. John O. Lafferty, Dr. James B. Hall, and Dr. O. D. Baxter, all of Charlotte, have announced the association of Dr. Thomas O. Coppedge, Jr.

Dr. Edward S. Bivens, Albemarle, has opened offices in the Stanly County Hospital there for the practice of radiology. He is a diplomate of the American Board of Radiology.

Dr. Clyde M. Gilmore, Chief of the Gilmore Clinic, Greensboro, has been made a Fellow of the American College of Cardiology.

The Duke University School of Medicine and Duke Hospital, Durham, have announced a month's course in Medical Mycology, to be under the direction of Dr. Norman F. Conant. The course is to be offered every day in the week except Sunday, from July 2 through July 28. Work with patients, clinical material, cultures and laboratory animals will serve as a basis for the course. Inquiries should be addressed to Dr. Conant at the University.

Dr. Phillip Handler, biochemist at the Duke University School of Medicine, Durham, will join a team of 12 medical educators who will go to Japan this month for the purpose of improving medical teaching there. The team will spend two months in Japan.

The Scotland County Memorial Hospital, Laurinburg, a 75-bed building, has been completed and was dedicated recently. The Pitt County Memorial Hospital, Greenville, a 120-bed unit, has also been recently dedicated.

OKLAHOMA

The Fifty-Eighth Annual Meeting of the Oklahoma State Medical Association will be held in Tulsa, May 21-23, Dr. Robert E. Funk, Tulsa, General Chairman, has announced. Arrangements for the meeting are being handled by the Tulsa County Medical Society. Headquarters for the meeting will be at the Mayo Hotel. The House of Delegates will meet May 20.

Dr. Roy E. Newman, Shattuck, has received a radiology fellowship at the University of Pennsylvania, Philadelphia.

Dr. E. C. Mohler, Ponca City, has been elected Chief of the Staff of the Ponca City Hospital.

The Oklahoma Academy of General Practice held its annual meeting at Enid April 16-17.

SOUTH CAROLINA

The Medical Society of South Carolina (The Charleston County Medical Society) recently started a new medical publication, *The Scribe*. Dr. J. I. Waring, Charleston, is the Editor, and Dr. J. A. Seigling, Charleston, is the Business Manager.

Continued on page 64

For the life that comes too soon

BE SURE YOUR HOSPITAL SUSTAINS PREMATURE LIFE WITH THE HUMIDICRIB . . .

Infant is served through opening in plastic cover . . . which is transparent . . . allowing full vision.

THE Castle Humidicrib automatically maintains humidity and temperature at the levels prescribed for the premature infant's individual condition.

It brings new help to the premature center by providing actual humidity in addition to temperature, precisely controlled. Both controls are selective and can be set at any desired point above room temperature, independently of each other.

For full details and case histories see your Castle dealer or write for free booklet. Wilmot Castle Co., 1180 University Ave., Rochester 7, N. Y.

Send for this FREE BOOKLET

Castle LIGHTS AND STERILIZERS

New Form of Levo-Alkaloids of Belladonna For Selective Spasmolytic Action

The practical value of an antispasmodic depends upon the degree of a desirable spasmolytic effect, convenience of administration and patient acceptance.

Degree of spasmolytic effect of belladonna alkaloids rests upon the intensity of parasympathetic inhibition. Pure levorotatory belladonna alkaloids (Bellafoline) are more potent and selective than belladonna alkaloid mixtures in producing this spasmolytic effect, at the same time minimizing the undesirable cerebrospinal effects.

Studies by *Kramer and Ingelfinger*, (M. Clin. North Amer., Boston No.: 1227, (1948) demonstrate the highly efficient action of Bellafoline. By balloon-kymograph studies on the human intestine they found that most commonly used antispasmodics are less effective than atropine (standard dose: 1/100 gr.). Bellafoline was the outstanding exception. It surpassed atropine in both degree and duration of action.

The antispasmodic effect of Bellafoline is augmented by a small dose of phenobarbital thereby reducing underlying excitability and tension.

Such an association of Bellafoline and phenobarbital is *now available in the form of Elixir Belladenal.*

Thus **Elixir Belladenal** fulfills the requirements for practicality by reason of: high efficacy, patient acceptance, convenience of dosage regulation. It is especially serviceable in pediatrics and in those adults where the use of tablets is impractical. The teaspoonful dose contains Bellafoline (levorotatory alkaloids of belladonna leaf) 0.0625 mg. and Phenobarbital 12.5 mg. The indications are those of **Belladenal Tablets**, e.g. Peptic ulcer, Pseudoulcer, Spastic colon, other hypermotility-hypersecretion states of the gastrointestinal-biliary tracts and genito-urinary spasm. Professional Samples and Literature available upon request.

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Write for our complete catalog of Laboratory Reagents and supplies.

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SPERSOL (DOAK)

Tetrachlor-P-Benzoquinone (SPERGON) in carbonwax. Available in 5%, 10% and 20% concentration.

SPERSOL (DOAK) is greaseless, stainless, odorless. Easily removed with water.

Indication: Ringworm of the Scalp (Microsp. Audouini or Lanosum)
Suggested Method of Treatment: Hair must be clipped every 10 days. Rub Spersol into the scalp nightly.

In 4 oz., 1 lb. and 5 lb. containers.

Clinical Samples on Request

DOAK COMPANY, INC.
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Lessening Illness in the Aged

By maintaining complete adequacy of the diet during advancing years, considerable can be accomplished in reducing the frequency of illness in the aged population and in favorably influencing the mental state of the geriatric patient. In particular, ample intake of protein, vitamins, and minerals is needed for preventing many somatic and psychic symptoms of malnutrition often observed in the aged.[1]

The dietary supplement, Ovaltine in milk, is a reliable aid for supporting the nutritional state of the elderly patient. This nutritious beverage richly provides biologically complete protein, minerals—especially calcium and iron—and all the vitamins considered essential. Used in the recommended amount, it can readily supplement even poor diets to full nutrient adequacy. It is easily digestible, invigorating, and pleasingly palatable.

Note the wealth of nutrients furnished by Ovaltine in milk, as shown by the table given below.

1. Thewlis, M., and Gale, E. T.: Ambulatory Care of the Aged, Geriatrics, 5:331 (Nov.-Dec.) 1950.

THE WANDER COMPANY, 360 N. MICHIGAN AVE., CHICAGO 1, ILL.

Ovaltine

Three servings daily of Ovaltine, each made of ½ oz. of Ovaltine and 8 oz. of whole milk, provide:*

PROTEIN	32 Gm.	VITAMIN A	3000 I.U.
FAT	32 Gm.	VITAMIN B_1	1.16 mg
CARBOHYDRATE	65 Gm.	RIBOFLAVIN	2.0 mg
CALCIUM	1.12 Gm.	NIACIN	6.8 mg
PHOSPHORUS	0.94 Gm.	VITAMIN C	30.0 mg.
IRON	12 mg.	VITAMIN D	417 I.U.
COPPER	0.5 mg.	CALORIES	676

*Based on average reported values for milk.

Two kinds, Plain and Chocolate Flavored. Serving for serving, they are virtually identical in nutritional content.

since 30%
OF HAY FEVER VICTIMS EVENTUALLY DEVELOP ASTHMA[1,2]...
it is important to note that:

"Alleviation of the patient's symptoms with the antihistaminics will not prevent asthma."[2]

Preseasonal treatment, by specific hyposensitization begun six to twelve weeks before the anticipated exposure to tree pollens, grasses, and weeds, affords "excellent relief" in 80 to 85 per cent of cases—with greatly reduced likelihood of complications such as asthma and sinusitis.[2,3]

ARLINGTON ALLERGENIC SETS

DRY POLLEN DIAGNOSTIC SETS

contain at least 23 vials of selected windborne pollens representing the major causative factors in your area, plus a vial of house-dust allergen. Each vial provides enough material for about 30 tests; diluent furnished with each set. Price, $7.50.

POLLEN TREATMENT SETS

provide serial dilutions of single pollens of your choice, or pollen mixtures chosen from our 21 stock mixtures. Each set contains five 3-cc. vials of the following concentrations: 1:10,000; 1:5,000; 1:1,000; 1:500; and 1:100. Dosage schedule accompanies each set. Price, $7.50.

SPECIAL MIXTURE TREATMENT SETS

prepared according to your patient's individual sensitivities. Each set contains five 3-cc. vials in the same dilutions as above. Ten-day processing period required. Price, $10.00.

1. Cooke, R. A.: in Textbook of Medicine (Cecil). Philadelphia, W. B. Saunders Company, 1947; seventh edition, p. 528.
2. Nevius, W. B.: J. M. Soc. New Jersey 46: 17 (1949).
3. Rosen, F. L.: ibid. 45: 389 (1948).

THE ARLINGTON CHEMICAL COMPANY
YONKERS 1 • NEW YORK

Continued from page 60

Dr. Paul P. Hearn has associated with Dr. J. W. McLean in Greenville, practice limited to otolaryngology.

Dr. Bruce Edgerton, Blackville, recently opened offices in Springfield.

Dr. William Craig, Jr., Pickens, has resumed his practice there.

Dr. J. G. Sylvester has opened offices in Florence for the practice of surgery.

Dr. William Marion Bevis has become a member of the staff of Edgewood Sanitarium in Orangeburg.

Dr. James A. McLeod, Florence, has left his practice there to join the Medical Corps of the United States Army.

The Annual Meeting of the South Carolina Medical Association will be held May 15-17 at the Ocean Forest Hotel at Myrtle Beach.

Dr. Robert Thomason, Greenville, was recently notified that he has successfully passed examinations to become a Diplomat of the American Board of Surgery.

Dr. Jim Flynn, Greer, will leave his practice there in June to begin residency in Ear, Eye, Nose and Throat at the Lawson General Hospital.

TENNESSEE

Dr. Luke Nabors, Morristown, has been elected Vice-President of the Midsouth Postgraduate Medical Assembly.

Dr. R. B. Donaldson, Dr. George W. Shelton and Dr. John J. Killeffer, all of Chattanooga, have been certified by the American Board of Orthopedic Surgery.

Dr. Jack Springer, Lawrenceburg, is now in military service and is stationed at the U. S. Naval Hospital at Portsmouth, Virginia.

Dr. John Youmans, dean of the Vanderbilt University School of Medicine, Nashville, has received a medal as a chevalier of the French Legion of Honor, from Joseph Jean Viala, French Consul General in Chicago.

The University of Tennessee College of Medicine, Memphis, will increase its enrollment from 140 new students a year to 200, beginning with the September quarter. Dr. T. P. Nash, Jr., Dean of the School of Biological Sciences and Chairman of the Committee of Admissions, announced that 50 new students would be admitted in the fall instead of 35. The increase in enrollment followed a $4,800,000 bond authorization measure which was approved by Governor Gordon Browning and the Tennessee Legislature, and which increases operating funds by $400,000 annually. The fund also will provide for a new chemistry-physiology building and a new building to provide facilities for postgraduate instruction to physicians and the training of other medical personnel. Six present buildings will also be remodeled.

The Oak Ridge Institute of Nuclear Studies has announced that three additional basic courses in radioisotope technics, of four weeks duration, and a three-week autoradiography course will be offered this summer by the Special Training Division. The three radioisotope courses will begin on June 11, July 9 and August 15, while the autoradiography course will begin July 2. Thirty-two participants will be accepted for each course.

TEXAS

Dr. Lex B. Smith, Midland, has been elected President of the newly organized District Heart Association which takes in eight counties in West Texas.

Dr. Wickliffe R. Curtis, El Paso, President of the El Paso County Medical Society, has been named chief of staff of the Southwestern General Hospital.

Dr. Paul B. Reaser opened offices recently in Longview. He is the winner of the American Medical Association's Billings Award for outstanding research presentation.

Dr. T. D. Frizzell, Quanah, has resigned as chief surgeon of the Quanah, Acme and Pacific Railway.

Dr. Aaron W. Christensen, Dallas, has been appointed regional medical director of the Federal Health Service in five Western states. They are Colorado, Idaho, Montana, Wyoming and Utah.

The Fifth Annual Symposium on Fundamental Cancer Research of the M. D. Anderson Hospital for Cancer Research was held in Houston, April 20 and 21, and was sponsored by the Texas Medical Center, Houston. The South Central regional meeting of the College of American Pathologists was held in conjunction with the Symposium and Conference.

The Baptist Hospital Tumor Clinic, San Antonio, sponsored a tumor symposium in San Antonio, April 12.

The University of Texas Medical Branch, Department of Dermatology and Syphilology, Galveston, has received a $3,000 gift for research from the Smith, Kline, and French Laboratories, Philadelphia, and another grant of $3,000 from the John and Mary Markle Foundation, New York, for studies on malaria. Dr. Clarence S. Livingood directs the department.

The University of Texas Medical Branch, Galveston, has received $6,600 from the W. K. Kellogg Foundation for participation in a curriculum planning program for nurses at the University of Chicago; $1,300 from the American Heart Association of New

Continued on page 68

Pregnancy–

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CAPSULES

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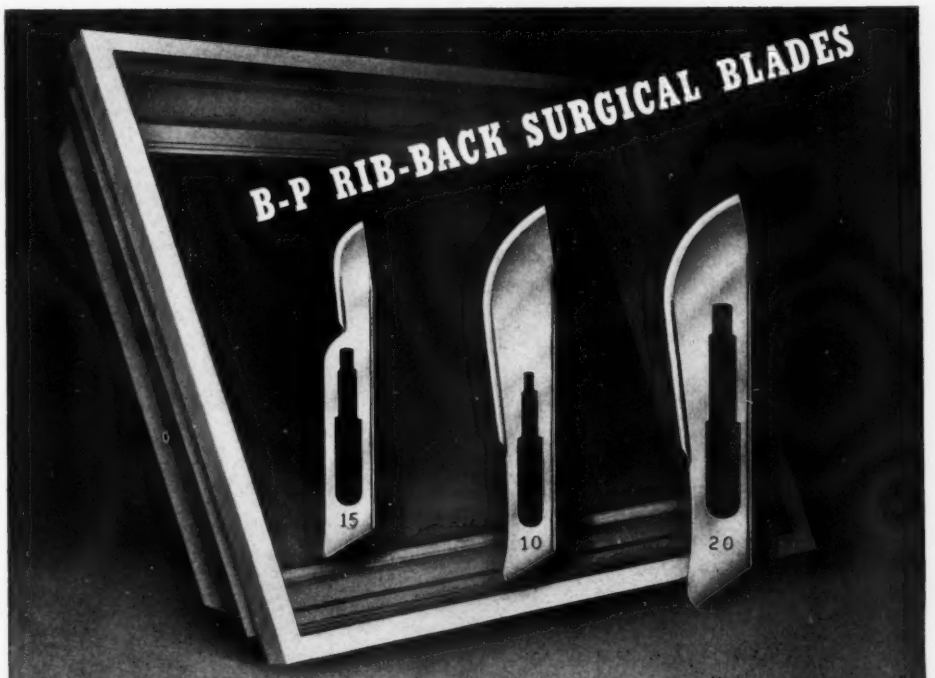

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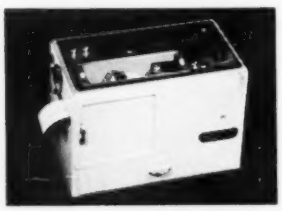

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THE BURDICK CORPORATION

Continued from page 64

York for research in the Department of Physiology; and $1,800 from the American Cancer Society for research in the Tissue Culture Laboratory.

A San Angelo Division of the University of Texas Postgraduate School of Medicine has been authorized by the board of regents. Dr. Victor E. Schultze has been appointed director of the division and professor of clinical medicine. The Shannon West Texas Memorial Hospital will be headquarters for the division. The San Angelo Division is the third of the Postgraduate School, which has its center in Houston and a division in San Antonio.

The Society of Life Insurance Medical Directors met in Galveston May 1.

Dr. James A. Greene, Chairman of the Department of Medicine of Baylor University College of Medicine, Houston, has announced that a new research laboratory to be named the Ben Taub Bacteriological Research Laboratory in honor of the man who made it possible, has been established in the Jefferson Davis Hospital, Houston. The laboratory will be under the direction of Dr. Ellard M. Yow, of the Department of Medicine of Baylor.

Dr. Jack R. Ewalt, Dean of the University of Texas Postgraduate School of Medicine in the Texas Medical Center, Houston, was inaugurated as President of the Group for the Advancement of Psychiatry which met in Asbury Park, New Jersey, recently.

Dr. Stuart A. Wallace, Chairman of the Department of Pathology of Baylor University College of Medicine, Houston, is the new President of the Southwestern Section of the American Association for Cancer Research for 1951.

Dr. George V. Miller, Galveston, has joined the staff of the M. D. Anderson Hospital for Cancer Research as Assistant Pathologist in the Clinical Section of the Department of Pathology.

VIRGINIA

The Virginia Pharmaceutical Association and the Veterans Administration have a plan in effect whereby the Veterans Administration will reimburse the pharmacists for drug bills incurred by a veteran in cases where the Administration has authorized such an account.

The Committee on Scientific Exhibits of the Medical Society of Virginia has announced that it will now receive applications for scientific exhibits for the October meeting of the society at Virginia Beach. The deadline for applications will be June 15. Applications should be sent to Dr. Eugene L. Lowenburg, 100 Medical Arts Building, Norfolk 10, Virginia. Dr. Charles H. Peterson, Roanoke, is Chairman of the Committee, and Dr. Lowenburg is Chairman of the Local Committee for Scientific Exhibits.

The Virginia Chapter of the American College of Chest Physicians met in the Richmond Academy of Medicine Building, Richmond, April 25.

Dr. L. J. Roper, Richmond, State Health Commissioner of Virginia, has been elected President of the State and Provincial Health Authorities of North America.

The twenty-fourth annual Spring congress in ophthalmology, otology, rhinoscopy, laryngology, facio-maxillary surgery, bronchoscopy and esophagoscopy of the Gill Memorial Eye, Ear and Throat Hospital was held in Roanoke, April 2-7.

Dr. James A. Smith, Health Officer of Page-Warren-Shanandoah Health District, is on military leave of absence.

The new Mary Washington Hospital, Fredericksburg, was dedicated at ceremonies recently, and is now occupied. More than 90 per cent of the equipment in the hospital is new.

The offices of the Medical Society of Virginia and the *Virginia Medical Monthly*, effective April 1, will be located at 1105 West Franklin Street, Richmond 20.

Dr. E. D. Vere Nicoll, Chief Assistant to the Orthopedic and Fracture Departments, St. Bartholomew's Hospital, University of London, has been appointed Instructor in Orthopedics at the University of Virginia Department of Medicine, Charlottesville.

Dr. Desmond R. H. Gourley (Ph.D.) has been appointed Assistant Professor of Pharmacology at the University of Virginia Department of Medicine, Charlottesville.

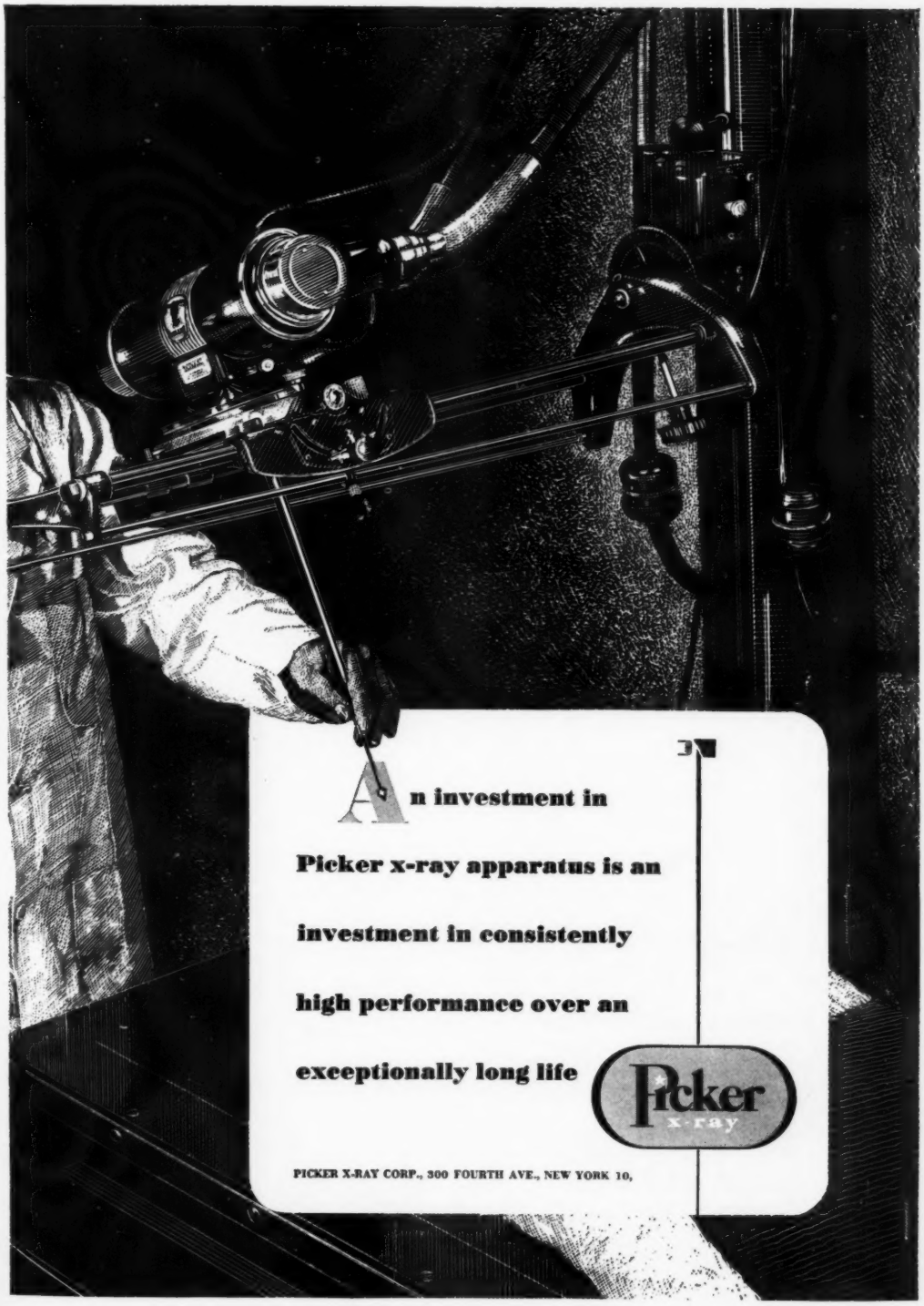
Dr. Lucius D. Hill, III, Resident in thoracic surgery, University of Virginia Hospital, Charlottesville, and graduate of the University of Virginia Department of Medicine, has been awarded the John Horsley Memorial Prize for his thesis on "Acute Renal Insufficiency and the Role of Potassium with Treatment by Intestinal Lavage." He was awarded the prize at the annual meeting of the Sigma Xi Society in Charlottesville.

Dr. Robert D. Wright, Professor of Social and Environmental Medicine, University of Virginia Department of Medicine, has been awarded a fellowship by the World Health Organization, which he will utilize to study Social Medicine and Human Ecology in several countries in Europe.

The Alexandria Medical Society sponsored its second annual Northern Virginia Clinical Assembly April 1 at the Charles Barrett School in Alexandria.

Col. John Powell Williams, Richmond, Professor of Clinical Medicine and Chief of the Medical Service at McGuire Veterans Administration Hospital, will be in command of the Forty-Fifth General Hospital, sponsored by the Medical College of Virginia,

Continued on page 72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The Journal of the American Medical Association, Vol. 144, No. 12, P. 1032.

". . . Our results may be summarized by recounting that eighteen patients were blocked thirty-one times during the course of a year. The results were excellent in thirteen cases or 72 per cent; fair in five cases or 28 per cent; and there was no failure." Southern Medical Journal, Vol. 43, No. 8, P. 675-678, "Angina Pectoris, Treatment by Injection of Stellate Ganglia with Ammonium Sulfate," by James B. Stubbs, M.D., and Robert Dean Woolsey, M.D.

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Continued from page 68

Richmond. The Hospital has been reorganized and is now a part of the organized reserved training unit in the Virginia Military District.

WEST VIRGINIA

Dr. Walter E. Vest, Huntington, has been elected President-Elect of the Federation of State Medical Boards of the United States.

Dr. Elizabeth McFetridge, Shepherdstown, has been re-elected President of the West Virginia Cancer Society.

The Annual State Health Conference will be held May 10-12 at Huntington, with headquarters at the Prichard Hotel. Civil defense and treatment of atomic casualties will be emphasized at the conference.

Dr. T. C. Sims, Fayetteville, has resigned as Health Officer of Fayette County to accept an appointment as Medical Director of the Regional American Red Cross Blood Center in Huntington.

The second annual camp for diabetic children will be held at Alum Creek, near Charleston, August 26 through September 3. The camp is sponsored by the Diabetes Committee of the State Medical Association and the West Virginia State Diabetes Association.

The summer meeting of the Medical Licensing Board will be held in Charleston, July 9-11, to examine applicants for licensure to practice medicine in West Virginia.

Dr. William E. Bray, Huntington, has been named a member of the Board of Regents of the American College of Clinical Administrators.

The annual meeting of the West Virginia Academy of Ophthalmology and Otolacyngology was held at the Greenbrier, in White Sulphur Springs, late last month.

Dr. E. M. Clubb, Jr., Moundsville, will become chief urologist resident at Roper Hospital, University of South Carolina, Charleston, at the completion of his second year of specialty training in urology at the Cleveland Clinic in June. Dr. Clubb plans to return to West Virginia to practice on completion of his residency.

Dr. Edwin O. Daue, Jr., Beckley, has gone to Harrisburg, Pennsylvania, where he will continue in practice of general surgery.

Dr. Robert A. McLane, Jr., Masontown, is now living in River Edge, New Jersey, where he is engaged in general practice.

Dr. J. L. Leef, Richwood, has been called to active duty in the Army Medical Corps. He is stationed at Fort Sam Houston, San Antonio, Texas.

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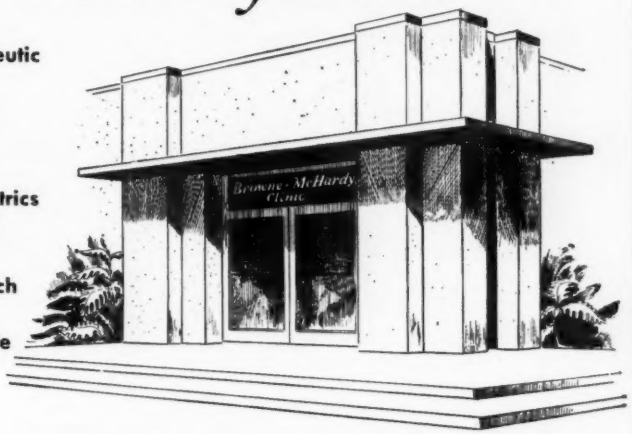

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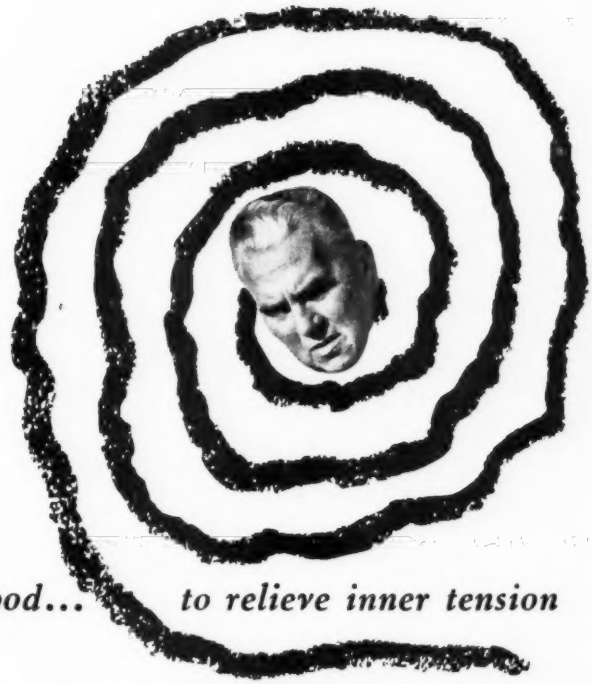

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